THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

Vol. XXIX. No. 716.] LONDON, JANUARY 30, 1877. [29th Year.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—12,000 cubic feet of gas per ton of coal; 28-candle gas; coke, 66·70 per cent.; volatile matters, 33·30 per cent. Coke of good quality.

RAMSAY'S PATENT CONDENSED GARESFIELD COKE.

RAMSAY'S ORDINARY GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.

GAS-RETORTS, introduced 1838. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.

Manufactories—Derwentaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne.

Address G. H. Ramsay, Newcastle-on-Tyne.

GENUINE TORBAY PAINT
AND
SPECIAL GASOMETER PAINT.

Four Prize Medals. Established over 20 Years.

These Paints are now used in 150 Country Gas-Works, and by all the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover far effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.

They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.

The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.

STEVENS & CO.,
(Successors to Samuel Calley.)
21, GT. WINCHESTER ST., LONDON.
Works: BRIXHAM, TORBAY.

THOMAS PROUD,
BROOKFIELD WORKS,
103, ICKNIELD STREET EAST, BIRMINGHAM,
MANUFACTURER OF
WOOD GRIDS
FOR
SCRUBBERS & PURIFIERS.
CONTRACTOR FOR
LAYING MAINS & ERECTING APPARATUS.
Light Steel Charging Coal and Coke Shovels, Charging Scoops, &c., &c., supplied promptly.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE.

Were the only parties to whom a Prize Medal was awarded at the Great Exhibition of 1851, for "Gas-Retorts and other Objects in Fire-Clay," and they were also awarded at the International Exhibition of 1862, the Prize Medal for "Gas-Retorts, Fire-Bricks, &c., for Excellence of Quality."

J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.

COWEN'S GARESFIELD COALS.
Coal Office,
Quay Side, Newcastle-on-Tyne.

Jos. Cowen & Co. are the only Manufacturers of Fire-Bricks and Clay Retorts at Blaydon Burn.

JOHN RUSSELL AND CO.,
LIMITED,
Established at the commencement of Gas Lighting.
Branch Establishments:
69, UPPER THAMES STREET, E.C.;
4 & 5, CHARLES STREET, SOHO;
16, SOHO SQUARE, W.;
49, GREEK STREET, SOHO SQUARE;
83, COMMERCIAL ST., SPITALFIELDS; } LONDON.
35, 36, 37, & 39, GRANBY ROW, MANCHESTER.
16, ELLIS COURT, AIRE STREET, LEEDS.
Manufactories:
ALMA TUBE WORKS, WALSALL, and
THE OLD PATENT TUBE WORKS, WEDNESBURY.

J. R. & Co., Ld., are the original manufacturers of Wrought-Iron Gas Tubes and Fittings, and Inventors of the LAP-WELDED TUBES for Locomotive and Marine Boilers.

J. R. & Co., Ld., make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.

Lists may be obtained on application to
Head London Office:
145, QUEEN VICTORIA STREET.
Head London Warehouse:
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JOHN BENT & SON,
BELL BARN ROAD, BIRMINGHAM,
MANUFACTURERS OF
WET AND DRY GAS-METERS,
OF
FIRST-CLASS MATERIALS & WORKMANSHIP;
Also, STATION-METERS, PRESSURE-GAUGES, STREET-LAMPS, REGULATORS, &c.

Established 1830.

THOMAS PIGGOTT & CO.,
SPRING HILL, BIRMINGHAM.
MANUFACTURERS OF
TELESCOPIC & SINGLE GASHOLDERS,
CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
Sugar, Saltpetre, and all kinds of Pans.
Roofs, Girders, and Bridges, and General Smith's Work.
London Agent—W. G. DAVIS, 2, Brabant Court, Philpot Lane, E.C.

J. & H. ROBUS,
BUILDERS AND CONTRACTORS
FOR THE
ERECTION AND REBUILDING OF GAS AND WATER WORKS.
ESTIMATES FREE
FOR MAIN-LAYING AND GENERAL REPAIRS.
RETORT-SETTING A SPÉCIALITÉ.

ROBUS'S IMPROVED RETORT-SETTINGS guaranteed to carbonize a large amount of coal with a small per cent. of fuel.

N.B.—All kinds of Fire Goods, &c., kept in stock for immediate delivery. Orders promptly attended to.

BELL GREEN, CATFORD, S.E.

THE
NITSHILL COMPANY'S
DUKE OF HAMILTON'S
LESMAHAGOW
CANNEL COAL.

AGENT:
JAMES M'KELVIE,
HAYMARKET,
EDINBURGH.

GEORGE GLOVER & CO.

PATENTEES OF THE

NATIONAL STANDARD GASOMETERS

FOR THE ENGLISH GOVERNMENT
AND FOR THE GOVERNMENT OF THE NETHERLANDS
AND OF THE DUPLICATE COPY
Presented by Her Majesty's Government to the French Government,
AND MANUFACTURERS OF

IMPROVED DRY GAS-METERS

Warranted to Measure correctly & not to vary.

RANELAGH WORKS, RANELAGH ROAD, PIMLICO, LONDON, S.W.

236, GEORGE STREET, GLASGOW, & 30, LANCASTER AVENUE, MANCHESTER.

FOREIGN AGENTS.
DAHL BROTHERS, COPENHAGEN. | W. HOVEN & SON, ROTTERDAM.
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JOSEPH AIRD,

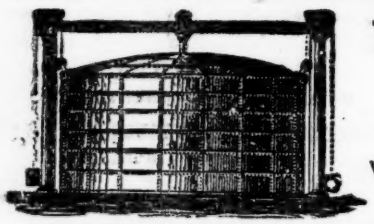
WELLINGTON TUBE-WORKS, TIPTON, STAFFORDSHIRE,

MANUFACTURER OF

EVERY DESCRIPTION OF TUBING, GAS, STEAM, HYDRAULIC TUBES AND FITTINGS,
EITHER BLACK, GALVANIZED, OR ENAMELLED HOT WATER TUBES AND FITTINGS,
CORE BARS, COILS, COCKS (IRON OR BRASS),
CHANDELIERS, &c., GAS-FITTERS' TOOLS, GAS TONGS, STOCKS, TAPS, DIES, &c., &c.,
HANDRAIL TUBINGS, IRON AND BRASS, PLAIN OR TWISTED,
TELEGRAPH TUBES OR POLES, &c., &c.

LAMBERT BROTHERS, WALSALL.

ALPHA TUBE & FITTING WORKS



W. C. HOLMES & CO.,

WHITESTONE IRON-WORKS, HUDDERSFIELD

MANUFACTURERS OF

RETORTS, ANNULAR AND PIPE CONDENSERS,
WROUGHT AND CAST IRON SCRUBBERS, PURIFIERS,
GASHOLDERS,

GOVERNORS, AND ALL THE NECESSARY FITTINGS FOR COMPLETING THE ERECTION OF GAS-WORKS.

STATION & CONSUMERS WET OR DRY METERS, STREET & SERVICE MAINS, LAMP COLUMNS & BRACKETS, & WROUGHT-IRON TUBES AND FITTINGS; WROUGHT-IRON ROOFS FOR ANY SIZE OF BUILDINGS.

Sole Makers of B. W. Thurston's Combined Condensing, Scrubbing, and Washing Apparatus,
AND PATENTEES OF THE IMPROVED COMBINED CONDENSING AND PURIFYING APPARATUS SO EMINENTLY ADAPTED FOR EXPORTATION.

REFERENCES TO UPWARDS OF 300 GAS-WORKS.

LONDON OFFICES: 92, CANNON STREET.

WEST'S GAS IMPROVEMENT COMPANY,

LIMITED,

ARE NOW PREPARED TO SUPPLY AND ERECT THEIR PATENTED MACHINERY FOR

CHARGING AND DRAWING GAS-RETORTS,

And to enter into arrangements with GAS COMPANIES for its use upon moderate terms of Royalty.

The Patented Machinery has secured the approbation of all Engineers who have visited the MAIDSTONE GAS-WORKS, *where it is in full operation, and may be inspected at any time on application to the Manager.*

The advantages attending its use are—

INCREASED VOLUME OF GAS PER TON.—INCREASED YIELD PER RETORT.—INCREASED BULK OF COKE FOR SALE.—REDUCTION IN LABOUR AND LESS DEPENDENCE ON SKILLED STOKERS.

A Pamphlet containing a description of the Machinery, and Copies of Reports on the working of the same, &c., will be forwarded on application to the MANAGING DIRECTOR, Maidstone. Communications may also be addressed to the Consulting Engineer, R. P. SPICE, Esq., M. Inst. C.E., 21, Parliament Street, London, S.W., or to the Engineer and Analyst, F. W. HARTLEY, Esq., A. Inst. C.E., 55, Millbank Street, London, S.W.

Established

1795.

JOSEPH CLIFF & SONS,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

London Wharf: No. 4, inside Great Northern Goods Station, King's Cross, N.;

LIVERPOOL: Back Leeds Street.

SPECIAL NOTICE.—Our Patent Machine-made Retorts have now been in *actual work* nearly 800 days, and are yet in good order. References on application.

WHITEHOUSE AND COMPANY, LIMITED,

GLOBE TUBE-WORKS, WEDNESBURY; & VICTORIA TUBE-WORKS, GREAT BRIDGE, STAFFORDSHIRE,

MANUFACTURERS OF

PATENT WELDED WROUGHT-IRON TUBES,

FOR GAS, STEAM, AND WATER;

GAS-FITTERS TOOLS, STEAM COCKS, AND ALL KINDS OF JOINTS.

HYDRAULIC TUBES, CORE BARS, TELEGRAPH POSTS, COILS, &c.

London Agent—ALFRED LAKEMAN, 9, FENCHURCH STREET, E.C.

GAS PURIFICATION & CHEMICAL Co., LIMITED.

(Successors to JOHN WILLIAM O'NEILL & CO.,)

Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

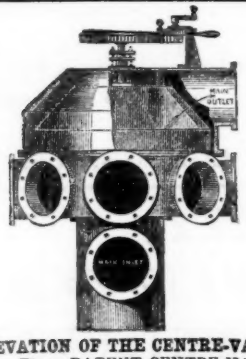
CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

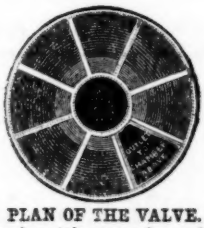
JOHN WILLIAM O'NEILL, SAMUEL H. JOHNSON. } Joint Managing Directors.

C. & W. WALKERS'

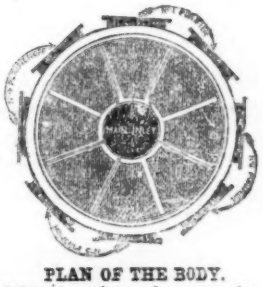
PATENT CENTRE-VALVES.



ELEVATION OF THE CENTRE-VALVE.



PLAN OF THE VALVE.



PLAN OF THE BODY.

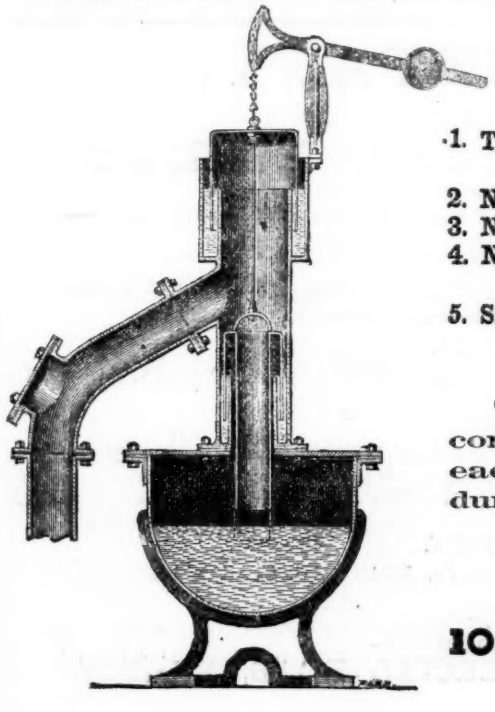
These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level: the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

MIDLAND IRON-WORKS. DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



ADVANTAGES.

1. There is no pressure on the Retorts.
2. No deposit of Carbon.
3. No scurfing is required.
4. Never a choked Ascension-Pipe.
5. Saves Fuel and Wear and Tear.
6. Gets 10 per cent. more Gas out of the Coal, and a higher Illuminating Power.
7. Is never out of order.
8. Requires no attention.
9. Is perfectly automatic in its action.

These Dip-Pipes can now be supplied complete, except the flanched bend, for £4 each, which includes the charge for licence during the whole term of the patent.

Applications to be made to

Messrs. CHANDLER & SONS,

104, NEWINGTON CAUSEWAY, S.E.,

Who fix the Dip-Pipes, at a small Charge, when required.

THE

IMPERIAL METER COMPANY,

LIMITED,

KING'S ROAD, LONDON, N.W.,

OFFICE: 115, VICTORIA STREET, WESTMINSTER, S.W.,

MANUFACTURERS OF

"WET" & "DRY" GAS-METERS IN IRON & TIN-PLATE CASES,

STATION-METERS AND GOVERNORS, STREET-LAMP METERS, BOXES, AND REGULATORS FOR THE AVERAGE METER SYSTEM.

Attention is called to their Dry Meters in Wood Cases, as used by the principal London Gas Companies. These Meters are especially suitable for seaport towns and for export.

The Company repair or convert every description of Wet Gas-Meters to De Castro and Burton's Patent.

EDWARD E. CROMBIE & CO.,

INVENTORS AND PATENTEES

OF THE

FRICTIONLESS DRY GAS-METERS,

Beg to intimate to Gas Companies and others that they are now prepared to supply these very superior Meters at the same prices as for the ordinary Gas-Meters.

In the construction of this Meter, for which the best tin plates only are used, every mechanical contrivance has been taken advantage of successfully to reduce the friction to a minimum, which is amply proved by the fact that they are made to work upon only one-fortieth of an inch pressure. By an improvement also in their construction, a steadier light is obtained, and greater capacity than can be got from any other Meter in the market. No gas can pass under the valves on any back pressure, as is the case with many other Dry Meters.

To Gas Companies supplying gas through streets with heavy gradients, these Meters are invaluable, as much gas is saved from the low pressure required to work them.

ALL METERS ARE UPHELD FOR FIVE YEARS.

METROPOLITAN WORKS, DIANA PLACE, EUSTON ROAD, LONDON, N.W.

FLETCHER AND MURPHY,

GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;

Manufacturers of

IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS.

And all kinds of Experimental Gas Apparatus.

WILLEY & COMPANY,

GAS ENGINEERS,

WORKS: COMMERCIAL ROAD, EXETER,

INVITE THE ATTENTION OF GAS COMPANIES AND OTHERS FOR THE SUPPLY OF

EVERY DESCRIPTION OF GAS APPARATUS.

ENGINEERING DEPARTMENT.

NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

GASHOLDERS AND TANKS.

RETORTS and RETORT-HOUSE FITTINGS, CONDENSERS, SCRUBBERS, ENGINES and EXHAUSTERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, &c.

METER DEPARTMENT.

They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

GAS-FITTING DEPARTMENT.

An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

PATTERN-BOOKS and PRICE LISTS furnished.

☞ PLEASE NOTE THE ADDRESS—

GAS ENGINEERING WORKS, COMMERCIAL ROAD, EXETER.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD,

MANUFACTURERS OF

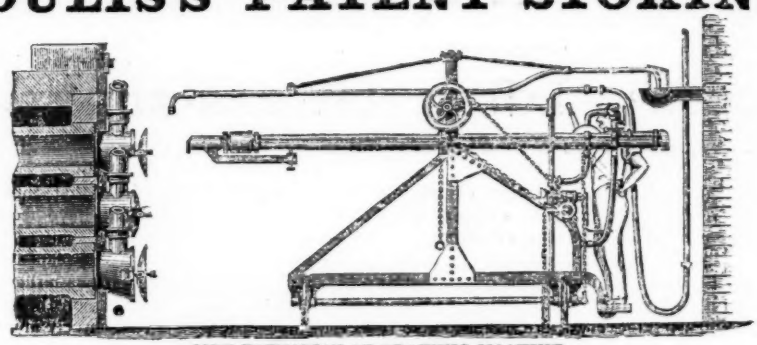
IMPROVED CENTRE-VALVES,

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

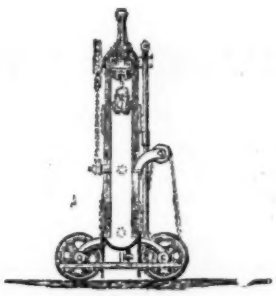
And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.

FOULIS'S PATENT STOKING MACHINE.



SIDE ELEVATION OF DRAWING MACHINE.



END ELEVATION.

(The Charging Machine will be Illustrated in next week's Advertisement.)

Makers: TANGYE BROTHERS and HOLMAN, London and Birmingham; ADAM WOODWARD and SON, Manchester; ROBERT LAIDLAW and SON, Glasgow; MASCHINENBAU-ACTIEN-GESELLSCHAFT HUMBOLDT, Kalk bei Deutz: Or all particulars may be had from JAMES WOTHERSPOON, 31, St. Vincent Place, Glasgow.

THOMAS ALLAN & SONS,

IRONFOUNDERS,

WORKS:

SPRINGBANK FOUNDRY & NORTH WOODSIDE FOUNDRY,

GLASGOW;

BONLEA FOUNDRY, STOCKTON-ON-TEES,

Manufacturers of

CAST-IRON GAS AND WATER PIPES.

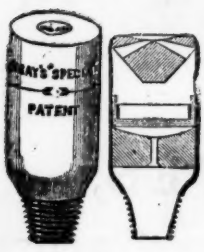
SIZES: ¾ to 12 inches at GLASGOW.

„ 1½ to 7 „ STOCKTON.

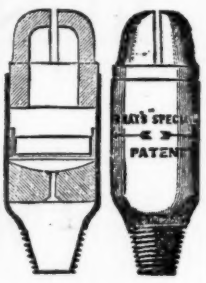
A LARGE STOCK KEPT, AND PRICES MODERATE.

Freight to London, in the Stream, 10s. per ton from Stockton; 12s. 6d. from Glasgow.

London Agent: Mr. A. C. FRASER, ST. STEPHEN'S CHAMBERS, TELEGRAPH STREET.



BRAY'S
NEW
GAS-BURNERS.



TRADE BRAY'S "SPECIAL" PATENT. MARK.

A NEW FEATURE IN GAS LIGHTING.

OUR WELL-KNOWN

PATENT "ENAMEL" REGULATOR GAS-BURNERS

(UNION JETS AND BAT'S-WINGS)

Were designed as improvements on the common Burners, and that object has been so successfully attained that they have, we believe, met with more approval and recommendation from the Gas Engineering Profession and the Public than have been accorded to any other firm's make of Burners since the commencement of gas lighting.

Of the two kinds of Burners—the Union Jet and Bat's-wing—in general use, the latter is the least useful, because of its want of adaptability to general circumstances, and great liability to get out of order; but, when in good order, it has hitherto had the advantage of yielding more light with common and medium qualities of gas than the Union Jet. The Union Jet, on the other hand, has the advantage of greater adaptability, being useful everywhere, is less liable to get out of order, requires scarcely any attention, and will stand more rough usage. Notwithstanding these great practical advantages, which are almost everything in a Gas-Burner, Gas-Burner improvers have been attracted to the Bat's-wing, because of its giving a more showy result when tested for illuminating power only.

We have succeeded in improving both Bat's-wing and Union Jet Burners; but, while adding materially to the efficiency of the first-named, it is specially noteworthy that the Union Jet has received most advancement by these improvements. While retaining all the advantages of the Union Jet, we have brought it up in ILLUMINATING POWER to the level of the most expensive Bat's-wings specially got up for developing that feature. The result is such that we have no hesitation in pronouncing BRAY'S "SPECIAL" UNION JET

THE BEST BURNER HITHERTO PRODUCED,

AND

A NEW FEATURE IN GAS LIGHTING.

The leading features of this NEW UNION JET may be summarized as follows:—

It gives more light, from the smallest to the largest sizes, than any Union Jet was ever before known to give.

It gives 30 to 60 per cent. more light than the common Union Jets, and 15 to 20 per cent. more than our own much commended Patent "Enamel" Union Jet.

It gives as much light as the most expensive Bat's-wings specially constructed for high illuminating power, without the Bat's-wing's disadvantages.

Tested on the Photometer at various consumptions—say, 3, 4, and 5 feet of Gas per Hour, or any similar variation—and the results averaged, our New Burner will show a higher illuminating power than the best Argand. If the tests are made downwards and upwards as well as laterally, the results will be still more in favour of our New Burner.

ADDITIONAL ADVANTAGES possessed by our NEW BURNER over all others in the market, and these are applicable and are added to our IMPROVED BAT'S-WING:—

In all Burners having an arrangement for diminishing the flow of Gas before it arrives at the point of ignition, that part of the Burner which effects this object has been a source of weakness, because of its being placed in a position very liable to fracture, and easily tampered with. Indeed, this is so arranged that any one can get at and break or widen out the inlet for the Gas at pleasure, and make what ought to be an economical Burner a most extravagant one. In our New Burner, this part is so hard that it cannot be enlarged by drilling, and is so arranged that it cannot be otherwise tampered with without breaking up the whole Burner; this forming, we believe, the most efficient safeguard yet introduced against the extravagant use of Gas by those who have not to pay for it.

The Gas Supply being given through one ROUND hole, which is made through non-corrosive material, it is not so liable to stop up or get out of order as in cases where a number of small holes or narrow slits are used. When these holes are made through *metal*, the lasting property of the Burner so constructed is almost *nil*, even if the aperture is not tampered with.

There is no hissing noise caused by the passage of Gas through the diminishing arrangement of this Burner.

☞ All our "Special" Burners have our Trade Mark stamped on the sockets thus BRAY'S "SPECIAL" PATENT.

GEORGE BRAY & CO., BLACKMAN LANE, LEEDS.

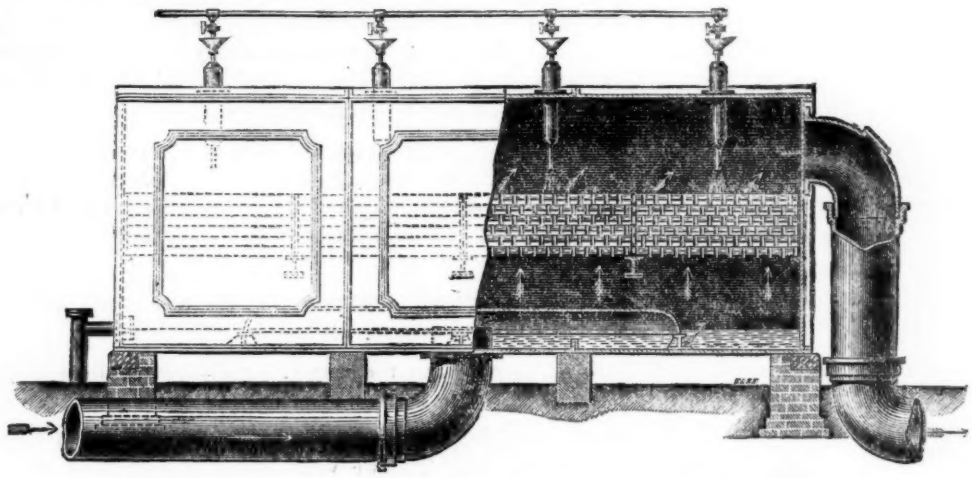
GAS PURIFICATION.

SAVILLE'S

SELF-DISTRIBUTING GAS SCRUBBER-WASHER.

PATENTED IN

GREAT BRITAIN, FRANCE, BELGIUM, PRUSSIA, AUSTRIA, & UNITED STATES.



MECHANICAL ARRANGEMENT.

THE Washer Tank contains a large bottom chamber, into which the Gas is freely admitted through an ordinary full-way inlet-pipe, passing first under an inverted vessel which removes any Tar remaining in the Gas after leaving the Condenser; it then rises slowly over the whole surface, CONTAINING AN AREA OF ABOUT EIGHT TIMES THAT OF THE INLET-PIPE, through equidistant spaces in a series of Self-Sealing Water Troughs, arranged in tiers, dividing itself and passing through the various dips until it reaches the upper chamber, and from thence through the outlet-main.

The washing liquid being CLEAN WATER is admitted by the Syphon inlets on top of Tank to the upper row of troughs, running through each successive tier, and becoming impregnated with the impurities extracted from the Gas, gaining strength at each dip on its descent, and finally passing off by the outlet syphon at the bottom.

It will be observed that in this Scrubber-Washer the Gas comes first in contact with THE STRONGEST LIQUOR at the bottom, and passes through WEAKER LIQUOR at each successive tier, until it issues through CLEAN WATER into the upper chamber; hence the true principle of Gas Purification by Washing is simply and automatically effected.

ADVANTAGES.

Great economy in first cost and foundations.
Great saving of other purifying apparatus and material.
Occupies little space, and stands only a few feet in height.
Being entirely self-acting, requires no motive power either for purifying or distributing.
The Gas is washed several times in ONE vessel, each time in liquor of a different strength, ultimately passing through CLEAN WATER.
Produces liquor of any required strength by once passing through.
Can be fixed (if desired) at any elevation to permit Contractors' tanks being filled without the expense of pumping.

One of these Scrubber-Washers has been in successful operation for the past twelve months at the Sowerby Bridge Gas-Works, and they are now being erected at the Corporation Gas-Works, Adderley Street, Birmingham, and at the Phœnix Gas-Works, Vauxhall, London.

Prices and full Particulars on application to

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Sole Manufacturers,

LAURENCE POUNTNEY LANE, LONDON, E.C.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

TO GAS ENGINEERS AND MANAGERS.

It having come to our knowledge that a report is in circulation, spread by some unprincipled person or persons, that the cases of our larger-sized Meters are made of Galvanized Iron, we think it only fair to ourselves, and just to our customers, to say, that we never have used, in making any of our Meters, a single pound of *Galvanized Iron*, or any other *cheap* and *inferior material*, and this can be easily seen by opening any of them.

The cases of our large-sized Meters, from 20 lights and upwards, are all made of the very *Best Best Patent Alloy*, which is nearly double the price, and will last more than double the time, of some other material that has been and still is very largely used for the same purpose. And our experience, acquired by an extensive use of it for upwards of 30 years, enables us to say with confidence that no other metal in use for the purpose is so little liable to corrosion from the action of the gas.

We have now in use a Meter made in 1848, and therefore 29 years old, the case of which is made of Patent Alloy; the Meter is still in perfect order, and shows no signs of decay.

The utmost care is exercised by us in selecting none but the very best materials for all parts of our Meters; much of it is made *expressly for us*, as it is not possible to obtain it in the open market of the same superior quality.

The great fall in the price of all materials used in making our Meters has enabled us to give an increased discount, thus giving our customers the benefit of the fall. This we were bound in fairness to do, as we raised the price of our Meters four years ago, when the price of all metals went up.

It will be our constant endeavour, by using none but the best materials, and employing the most skilful workmen, to maintain the high character our Meter has hitherto borne.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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METERS FOR MEASURING WATER.

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Subscribers who desire to avail themselves of the reduction in the subscription to the JOURNAL by paying in advance for the year 1877, are reminded that this can only be done during January.

Post Orders to be made payable at the Chief District Office, St. Martin's-le-Grand, London, to William B. King.

Vol. XXVIII. (second half of 1876) is now ready, bound in cloth, gilt letters, price 18s. Cloth cases for binding may be obtained on order from any bookseller, or from the Publisher.

TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JANUARY 30, 1877.

Circular to Gas Companies.

THE "silly season" is fast passing away, and hence it may be that the columns of *The Times* have ceased to be occupied by further correspondence on the "Commission" system. It was Thackeray, we rather think, who first gave the name of "silly season" to the interval between the prorogation and reassembling of Parliament, during which, as the columns of newspapers must be filled, letters on various subjects have to take the place of speeches in Parliament. The name is not particularly appropriate, for average newspaper correspondence is not more silly than average parliamentary talk. To return, however. The "Commission" discussion has come to an end, and we are glad of it. Some Scottish friends of ours, for whom we have a great respect, threaten to reopen it in a more virulent form; but, perhaps, second thoughts will induce them to keep silence. We have endeavoured to extract a moral from the story told, so far as it concerns a class whom we may justly call our clients. Let managers and others concerned in the conduct of gas undertakings be adequately paid, and then the temptation to accept bribes will cease. We hope that both Companies and Corporations will take our advice to heart, and that we shall hear fewer complaints of the insufficient remuneration of their superior *employés*. If this advice be acted upon, the "Commission" system will be effectually squelched, with all its immoral tendencies. We may dismiss the unsavoury subject now, with the fervent hope that we shall never have to return to it.

The letter of Mr. Woodall, of Leeds, published in our last issue, came too late to be noticed simultaneously with the publication. The writer is unnecessarily sensitive. He stands too high in the estimation of his fellow-managers to suppose that any one will, for a moment, imagine that he is responsible for the state of things with which he has to contend. They were all inherited, and our complaint has only been, that the Corporation have not attempted with sufficient alacrity and enterprise to remedy faulty conditions of which they possessed an accurate knowledge. We may assume that they will presently, in conjunction with the erection of additional works, proceed with the alterations of the mains, which would seem to be even more imperatively required. And then will come the control over services and internal fittings, which we have always contended that Gas Companies and Gas-supplying Corporations should exercise. Mr. Woodall mentions some facts which we should hardly think can be paralleled in any town in the kingdom, and they go to show that gas suppliers should have legal powers to supervise, and even prescribe, the internal fittings. Nine-tenths—we might say ninety-nine hundredths of the complaints brought against Gas Companies have their origin in causes beyond the control of the Company—such as small connexions and rusty burners.

In their desire to remedy the alleged grievances, the Gas Committee of the Corporation are, we think, about to make a great mistake. They propose to raise the illuminating power of the gas to eighteen candles. Now, it is clear that while the condition of things described by Mr. Woodall remains, the raising of the illuminating power two or three candles will only result in a waste of money. With a proper distributing plant, no increased power would be necessary, and it might possibly be reduced with advantage. As a matter of general experience, we think we may safely say, that from fourteen to fifteen candle gas gives the greatest satisfaction.

Some correspondence in a Leeds paper informs us that, in accordance with the provisions of the Leeds Gas Act, the gas is now only tested at the works. In the days of the Companies, the Corporation had a testing-station in the town, and we should have thought that this would have been continued. The Corporation and their Gas Manager have, however, a very difficult problem to solve, and we can only wish them "a happy issue out of all their afflictions."

Perhaps, for once, our "Circular" might be more appropriately addressed to Corporations than to Gas Companies, for the next topic we have to allude to is the gas affairs of the Corporation of Wigan. The most intense dissatisfaction is manifested in that borough, and we report, in another column, the proceedings at a meeting called to give emphatic expression to that dissatisfaction. It is the old, old story. Gas bills increase in amount, and the public mind can only find one explanation. A singular misconception as regards the use of the exhauster is obviously the source of the suspicion that Gas Companies have the power of forcing atmospheric air into their mains, which air, as the reverend chairman of the meeting put it, acts as much on the meter as the pure unvitiated gas. We confess to being greatly puzzled by these complaints from Wigan. The official testings represent the gas as being fully up to, and, generally, considerably above, the statutory requirements. It is with no particular pleasure that we note that some of the consumers regret the extinction of the Company, who would seem to have given perfect satisfaction. The Corporation have not been very successful in the management of the undertaking, and now affairs seem coming to a crisis. We shall wait, with some curiosity, to see what explanation of the alleged extraordinary increase in the gas bills is offered; and here, at once, we recommend the Corporation to exercise all the control they have power to do over the internal fittings of their customers, for, no doubt, defects in these lead to an exaggerated consumption, which the consumer never discovers until his gas bill is sent in. All the cases of

complaint, however, cannot be explained on the hypothesis of defective fittings; but we cannot believe that the collectors exercise their imagination in settling what the amount of a gas bill ought to be.

The undertaking of the Warrington Gas Company may now be said to be sold to the Corporation, for, somewhat to our surprise, after all that has transpired, the poll of the town resulted in a majority of 588 in support of the Town Council and the purchase. That the result is a *bonâ fide* expression of opinion on the part of the ratepayers may be confidently inferred from the large number who voted, and who must, upon an ordinary estimate, have been a vast majority of those who could possibly have votes. It is a great triumph for the Town Council, considering all the abuse that has been bestowed upon them, and all the opposition that has been raised; and since we consider the terms of purchase fair, if not liberal, we do not commiserate the Gas Company. No doubt the trenchant letters of Mr. Spice, contributed to the columns of the *Warrington Examiner*, greatly contributed to set the public mind right as to the present value of the undertaking and its promising future. We may part from the Gas Company with the sincere expression of a hope, that the Corporation may be as successful in their management. Unlike cases before referred to, the Corporation of Warrington will take over an undertaking perfect in all its parts, and they have simply to maintain the efficiency, and extend as may be required. We may be excused here for pointing out to the Corporation that the duty they will presently assume will be that of supplying gas to their constituents at the lowest possible cost, and that they have no moral right to tax the consumers of gas in order that rates may be reduced, or public improvements made, with gas profits.

At a meeting of the Town Council of Salford last Wednesday, the Chairman of the Gas Committee said he hoped shortly to be in a position to move a resolution lowering the price of gas. The extent of the contemplated reduction he did not announce, but it will probably be threepence per 1000 feet. This, as gas affairs stand in Salford, will be very satisfactory. We mentioned, some weeks ago, that the Gas Committee had reported to the Council that the expenditure of £160,000 was necessary for alterations in, and extensions of, the gas-works. The report, we are glad to see, was adopted by a large majority in the Council. The proposed works are urgently needed to place the undertaking in a proper position, present and future. Mr. G. Livesey's advice was secured by the Council, and that, with the experience of Mr. Hunter, the manager of the works, is a sufficient guarantee that not a single pound will be expended unnecessarily.

The Ilkeston Gas Company have made application to the Board of Trade for a Provisional Order; but the Local Board, being desirous of acquiring the undertaking, resolved to oppose the Company. Last week they went to what we must regard as the unnecessary expense of polling the parish on the question; the result being a large majority in favour of the opposition resolved upon by the Local Board. What grounds of opposition the Board can offer, it is out of our power to guess. If they like to make terms for the purchase of the undertaking, we dare say they may succeed; but they must establish much against the Company before they will persuade the Board of Trade to refuse the Order prayed for.

The Town Council of Louth seem disposed to compose their differences with the Gas Company, and offer to abstain from parliamentary opposition, if the Company will make some concessions. The Bill promoted is to re-incorporate the Company—a very old one—and to give power to capitalize some expended profits, and also a small sum of money advanced by shareholders. It, of course, incorporates the General Act of 1847; but the Town Council desire that a clause shall be transferred from an old Act of theirs, which enacted that after paying a ten per cent., or, as we must now say, a maximum dividend, the surplus profit of the Company should be applied to the reduction of the price paid for public lights, or, in other words, to the reduction of rates. This Act, we may assume, was passed before the general measure of 1847, and, we may take it, confers no power to form a reserve or other fund. The Company will probably contend for power to form a reserve, and we do not see how their right to it can be contested. When that fund is formed, the question of the application of surplus profits can be easily settled, and we do not know that a better plan could be arranged than to apply them in the way the Council wish. Some other small concessions are asked for, which the Company can have no reason for refusing.

A motion of a very amusing character was brought forward at a meeting of the Town Council of Dublin last Tuesday. It will be remembered, that in the session of 1873 the Corporation of Dublin promoted a Bill to effect the purchase of the undertaking of the Alliance Gas Company. To support their case, they engaged a number of engineers and other scientific witnesses, some of whom visited Dublin, and all of whom gave evidence. The Bill of the Corporation, as we all know, was rejected, and one consequence has been that the gentlemen engaged by the Corporation have never been paid their legitimate charges. If our memory serves us, two have brought actions and gained verdicts; but whether or not they have been paid their charges and law expenses is not known to us. It looks as though some others were now pressing for payment; at all events, at the meeting mentioned above, Mr. Byrne proposed a modest motion, to the effect that, since the Corporation had no power to pay their own debts, the Gas Company should be asked to pay them, on the ground that the latter alone profited by the evidence given. We may be excused for doubting whether the evidence given in favour of the Corporation was of the smallest value to the Company, and we could not recommend the latter to entertain for a moment Mr. Bryne's proposition, if it should ever come before them. The Alliance Company have recently "made "a present"—to use the phrase of the chairman of a Metropolitan Gas Company—to the citizens of Dublin of £8000 a year. Surely the rich citizens who profit by this might help the members of the Town Council in discharging what is called a "debt of honour," but which may be found to be something more serious, if the creditors push their claims. If our memory serves us, a Mr. Byrne was brought over from Dublin as junior counsel for the Corporation. Has he ever been paid his fees and expenses?

We receive, at the last moment, the report of the Directors of the Chartered Gas Company for the past half year, which we reprint in another column. It will be seen that, notwithstanding heavy payments for commutations of annuities, which have been made out of current profits, the finances of the Company are in a highly satisfactory state. It seems clear that the Directors will have no occasion to regret the reduction of threepence per 1000 cubic feet of gas from the commencement of the present year. We shall have occasion to refer again to the matter when we publish the accounts.

Water and Sanitary Notes.

Water affairs at Richmond (Surrey) naturally attract a good deal of attention, even beyond the limits of the district. The case is, indeed, peculiar, and, according to our recollection, unprecedented. We do not remember to have heard of a case in which the whole supply of a considerable town was cut off. Of course, as we said last week, we do not blame the Southwark and Vauxhall Company for acting as they have done; but, nevertheless, we think the step they took unwise. For our own part, we should have been disposed to try competition. It is true that, on inquiry, which we made in Richmond last week, we got more than hints that a species of terrorism had been exercised over the tradespeople, to persuade them to support the Vestry. We did not hear a single complaint of the quality of the Company's water. The grievance alleged was, that the rates had been suddenly doubled, for no reason that the consumer could appreciate. Now, if the Company had reverted to their original rates, we cannot help thinking that they could have held their own against the Vestry. The inhabitants of Richmond hardly know, perhaps, to what they have committed themselves. Our first inquiry, "How are you off for "water?" was addressed to a woman at the door of a small house. The reply was, "We have no water!" To a further question, "How do you get what you want?" the answer was, "We beg "it from Mr. —— and Mr. ——, who have pumps." Now, it is not unimportant to know that the Public Health Act may give the Vestry power to shut up these wells as soon as their water undertaking is fully installed. They will only require the certificate of a *doctrinaire* Officer of Health and chemist that the water is unfit for domestic use, and forthwith a chain must be put on the pump-handle, or the well be filled up. The inhabitants will be compelled to take water of the Vestry, in the absence of a competing supply. Proceedings of this kind are going on all over the country; wherever the water supply is in the hands of a local authority, there is a war against private wells. No proof is ever offered that the water ever did any harm; but a chemist certifies that it is unfit for use, and forthwith a well is ordered to be closed. Provincial newspapers have, during the past week, afforded us several examples of these proceedings.

In our walk about Richmond it seemed to us that the work of connecting the houses with the mains of the Vestry was proceeding very slowly. The matter is peculiarly urgent, and we thought we noticed that the British workman was displaying his usual characteristics, and was particularly lazy. The men used their pickaxes in a way that suggested they were afraid of

inflicting pain on the roadway, and when they had made a trench they sat composedly in it, apparently expecting that the coils of leaden services would connect themselves. Plumbers appeared conspicuous by their absence; and the general impression we obtained by our walk through the town was, that a supply from stand-pipes and private wells would be required in Richmond for a considerable time to come.

More important than all, however, is the question whether, when they have connected all the services, the Vestry will be able to maintain an efficient supply without going to further large expenses. We have, more than once, expressed a strong belief that they will not; and it is evident, from the terms of the resolution passed at the meeting, reported in another column, that many in the town entertain a like opinion. It is a most serious matter for the ratepayers of Richmond, for in one way or another they must be taxed for their water.

Yesterday, a metropolitan deputation was to wait on the Home Secretary, to request him to take into consideration the Water Supply of the Metropolis. The hour at which we are compelled to go to press prevents us from giving any report of the proceedings, so we quote from an anticipatory notice in the columns of a contemporary. The deputation were to complain, first, of the quality of the water, which it is correctly said is condemned by the Rivers Pollution Commission—or, as we should say, by Dr. Frankland, for the "Commission" was a farce—and also by the Royal Commission of 1866, which, we think, is not quite a true statement. Further, the deputation were to complain of excessive water-rates, and we shall not deny that on this score some grievances do exist. But it must be accepted as a fact, that the domestic water supply in the Metropolis is exceptionally cheap. We have the best reasons to know of a house rated at £36 per annum, and the water-rate is £1 16s.—that is, five per cent. per annum on rateable value. What would it be if the water undertakings were in the hands of the Metropolitan Board, as recommended by the deputation to Mr. Cross? We venture to think that the Board could not possibly supply water at a lower rate. A differential rate for warehouses, under close inspection, seems to us to be desirable, and the adoption of this would go a long way to quiet agitation. We shall refer again to this matter, when we see what the deputation said and Mr. Cross promised.

The resolution of the Liverpool Town Council to attempt the extension of their well system has brought upon them a deputation from manufacturers who object to a supply of hard water. Nevertheless, all the preliminaries seem to be arranged for the sinking of a new well at Bootle. In the course of one, two, or it may be three years hence, we may learn the true results of the experiment. In the meantime, the demands of Liverpool and the neighbourhood will about equal the possibilities of supply; and, if the experiment should fail, a serious embarrassment will arise. It would be several years before any one of the gravitation schemes proposed could be made available; and thus a water famine in Liverpool is within the range of possibility. We have always expressed an opinion that the extension of the well system would prove a failure; we are confirmed in this belief by the statement of the manufacturers who have sunk wells in Liverpool and obtained brackish water. The new red sandstone is a very permeable stratum, and, no doubt, excessive pumping from it in the neighbourhood of Liverpool would soon attract water from the Mersey.

Of many things which lie before us for notice, we have now only space to mention one. The sewage farm of the Local Board of Crewe has before been alluded to in these columns. It has been a disastrous failure throughout. Last year a rate of 1s. 2d. in the pound was required to make up the loss on the current expenses. The entire loss to the ratepayers since the farm was instituted is truly said to be "something enormous." The Board have now decided to lease the farm, which may, or may not, bring down the rates. We should very much like to know who selected the site of, and laid out, this farm.

Price of Water at Huddersfield.—At the last meeting of the Town Council of Huddersfield it was resolved that—"From and after the 1st of March next the charge for water taken for trade purposes by meter be reduced to 6d. per 1000 gallons within the borough."

Price of Gas at Winchester.—The *Hampshire Independent* says: "The 'ministry' at our gas-works have taken a reductive measure in an announcement that on and after April 1st they will reduce the present price 3d. per 1000 cubic feet, making it then 4s. 6d. We hope this will be seductive enough to warrant the corporation in reverting to the use of gas again for the public lamps."

Widnes Gas Supply.—We are informed, on competent authority, that the figures quoted in the last Journal (page 133) as to the make of gas in 1876 were wrong. By an error in copying, the returns for the month of December were inserted for the returns of the whole year. The corrected statement is as follows:—Make of gas for the year 1876, 62,622,000 cubic feet, as against 55,619,000 cubic feet in 1875, being an increase of 12·5 per cent.

THE GASLIGHT AND COKE COMPANY.

Report of the Directors to be submitted to the Proprietors at the Half-Yearly Ordinary General Meeting to be held on Feb. 9, 1877.

The accounts herewith submitted of the working of the company during the half year ending on the 31st of December last exhibit an improvement in almost all their details. The principal items in which the reverse is perceptible are those having reference to general wear and tear, and to the sale of coke. The increase in the amount expended on the first is chiefly due to the fact that the works at Beckton, which have been in operation since 1869, are now beginning to require the ordinary repair and renewal; the decrease in the last is attributable to the unexampled mildness of the winter months covered by the period to which this report has reference. The latter cause, coupled with general dulness of trade in London, has also operated to prevent the increase in the company's rental for gaslight proceeding at the normal rate; but the sustained improvement in manufacture, which was noticed in the last report, and a further reduction of the unaccounted-for gas, have materially tended to alleviate its effect.

After providing for payment of interest on the debenture and other preference capitals, the directors are enabled to declare dividends at their respective parliamentary maximum rates on the unguaranteed stocks, and a dividend at "the standard rate" of 10 per cent. on the ordinary stock of the company, and to carry forward an undivided balance of £43,426. The restrictions of The Gaslight and Coke Company Act, 1876, have prevented the directors from placing any portion of this surplus to the credit of the reserve-fund, the Act requiring such a step to be taken only in connexion with a reduction in the price of gas. To this important object, however, the directors have been assisted by the condition of the coal market; and they have the pleasure to state that, from the favourable nature of their existing coal contracts, they felt justified, in the month of October last, in announcing that, from the first day of this year, their charge for gas would be reduced to 3s. 6d. per 1000 cubic feet.

It will probably be found that this reduction in price will induce a larger consumption of gas throughout the company's districts; and to provide for such a contingency, as well as for the ordinary increase of trade, the directors are actively employed in adding to the producing and storing plant at their principal stations. They are also now engaged in the digest of a scheme for the improvement of their distributing power by the connexion of all stations by means of trunk mains of the largest size, and they are of opinion that a liberal, though cautious, expenditure on such objects will be found to be conducive alike to an efficient supply to consumers and to the interests of proprietors.

As intimated in their last report, the directors have permitted the commutation of pensions by all the retiring officers of the various amalgamated companies who chose to avail themselves of that privilege, the scale of commutation being that laid down by Parliament, and a very serious annual burden on the funds of the company will thus be removed.

The directors have also completed the other arrangement which they foreshadowed in their last report, and have established the fund therein alluded to for the guarantee of the fidelity of their own officers, which they believe will be beneficial to all parties concerned.

During the half year, but one subject for uneasiness has presented itself. The high standard of purity in the company's gas, required by the Gas Referees, acting in pursuance of the City of London Gas Act, 1868, and of the Company's Act of last session, has necessitated a return to the employment of lime as a purifying agent. The mode of purification thus adopted has enabled the directors to comply with uniform success with the requirements of those officials, but it has also unfortunately entailed upon them a difficulty which past experience had led the directors to apprehend. In spite of every precaution taken by their officers, or suggested by the Gas Referees themselves, in dealing with the removal of the foul lime from the purifiers, the company have been threatened with legal proceedings by vestries and other public bodies, and individuals, in various parts of the districts contiguous to their manufacturing stations, to compel the abatement of the annoyance resulting from its use, for which the directors are in no sense responsible. To free themselves, therefore, from the dilemma in which they are thus placed, the directors have, after much consideration, determined upon the presentation of a Bill to Parliament in the ensuing session, for affording them relief, and they are not without strong reasons for hoping that their application will meet with public support. Should the Bill pass into an Act, and the company be permitted to revert to the means of purification recently employed, all cause of public complaint will be removed.

All descriptions of the company's debenture, preference, unguaranteed, and ordinary stocks and shares, are now quoted in the official list of the Stock Exchange.

Richard Howe Browne, Governor.

Horseferry Road, Westminster, S.W., Jan. 26, 1877.

Margate Water-Works Company.—The annual meeting was held on the 22nd inst.—Mr. W. W. Pickering in the chair. The report of the directors stated that the company's affairs were in a very prosperous condition, and a dividend of 5 per cent. for the half year was recommended and adopted by the shareholders. The outgoing directors and auditor were re-elected, and reference was made to the loss sustained in the death of Mr. W. Barker, who had been connected with the company since their commencement. The question of the water supply for the Cliftonville district was introduced, and it was stated by the directors that a fine supply of water had been found at the new pumping-station in the Dane, it being confidently anticipated that the new spring would be amply sufficient to meet the requirements when the pumping apparatus was in working order.

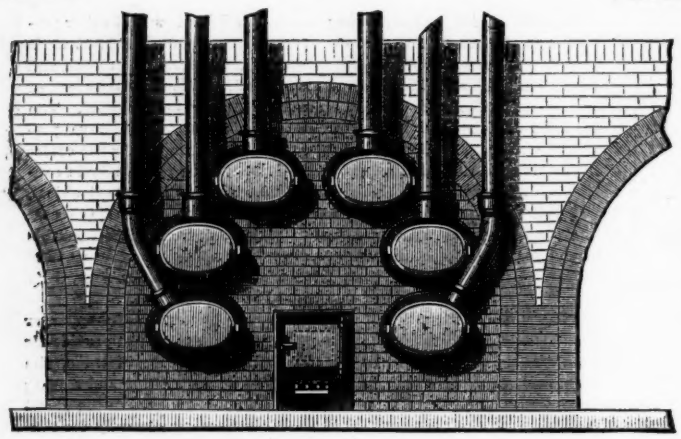
Correspondence.

OECHELHÄUSER'S SYSTEM OF RETORT-SETTINGS.

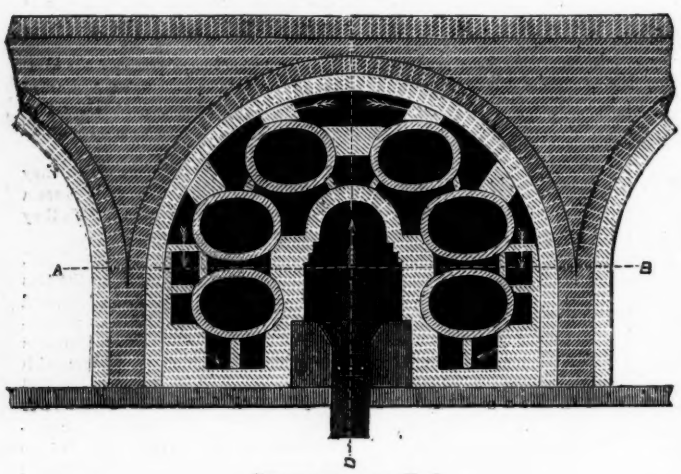
SIR,—Your esteemed JOURNAL has brought to us this year some very interesting articles about retort-settings and their construction. I beg you to allow me to send you a sketch of retort-setting which is nearly exclusively used on the Continent, and the construction of which is the invention of one of the most important men in gas-making—namely, Mr. W. Oechelhäuser, Privy Councillor, and chief director of the German Continental Gas Company at Dessau.

This retort-oven, as shown by the diagram, is a setting of six, and was first introduced between 12 and 15 years ago into the gas-works of the company before mentioned.

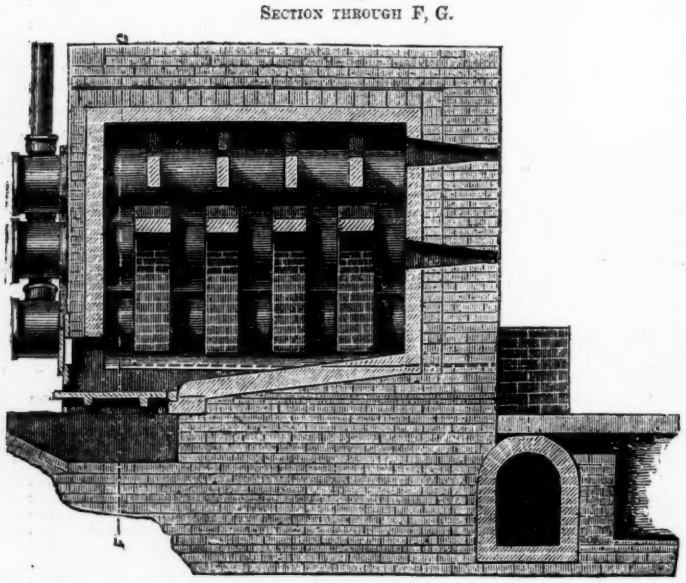
It is a well-known fact that in the larger works in France, as well as in Germany, the temperature in the retorts is higher than in England, by which naturally results a larger supply of gas per retort per day. No doubt the German Continental Gas Company had reached, in this respect, the maximum, as may be shown by their annual reports read at the general meetings of the company, and published in different journals.



FRONT ELEVATION.



SECTION THROUGH F, G.



SECTION THROUGH E, D.

In the setting of six retorts according to the enclosed design, the retorts are 8½ feet long and 14½ by 20½ inches in diameter, and produce from 50,000 to 60,000 cubic feet of gas in 24 hours.

In order to demonstrate more clearly to my brother managers the superiority and excellence of these retort-settings, please allow me to give some figures of management, the true criterion of a good retort-oven. They are charged, in regular working, every four hours, with a quantity of from 1800 lbs. to 1900 lbs. of coals, which is adequate to a daily quantity of 108 cwts. to 114 cwts. of coals for the production of gas.

To obtain such results, the temperature must be raised to nearly a white heat. The quantity of fuel necessary for the extraction of gas from the above-mentioned quantity of coal daily is between 16 cwts. and 17 cwts.; or, to give here, too, some average numbers obtained by us—for every 100 lbs. of coal for gas-making, 18 lbs. to 20 lbs. of fuel are required for firing.

The durability of these retort-ovens, although worked at such a white heat, is no less than with others at a lower temperature, supposing the materials, retorts, bricks, &c., are of the best kind. According to the annual general report of the German Continental Gas Company, 1875, one new retort only was used for every 4½ million cubic feet of gas produced; or, what is the same, every retort produced 4½ million cubic feet of gas before it was changed for a new one. According to the same annual report of the company, every retort had produced daily—that is, in 24 hours—8314 cubic feet of gas in their gas-works at Warsaw. It must be remarked here that no cannel is employed.

The opinion until now generally accepted by several engineers, that at such a high temperature the gas became bad, or lost its illuminating power, is not confirmed by practice; but it is only necessary that the latter time of distillation—that is, the time in which the light oxide gases are principally produced—must be abridged, and the following charge must be begun.

Besides many other improvements and proficiency in gas-making on the Continent, we owe to this celebrated investigator, Mr. Oechelhäuser, the most perfect consumption of tar in retort-ovens, instead of our usual coal firing. The burning of the tar is so complete that not the smallest particle of smoke escapes from the chimney. Generally it may be taken for granted that every 100 lbs. of tar used as firing material is equal to 170 lbs. of coal. Whether the one or the other of the above methods of firing is to be used, must be shown by a simple calculation upon the prices and the sale, as well of coals as of tar.

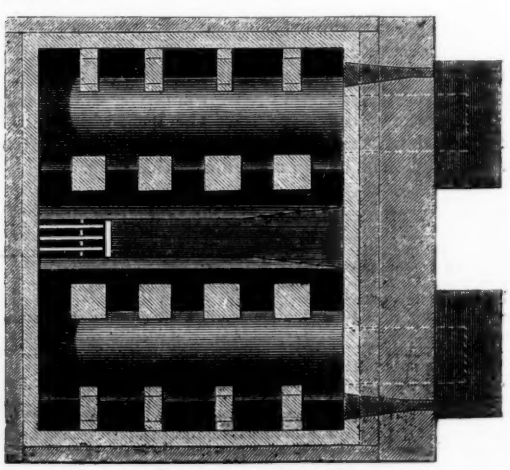
In the same manner, Mr. Oechelhäuser has been the first who practically introduced into Germany the generator-furnaces from France, which he improved in a very practical manner, so that all gas-works of his company, according to this system, will be fitted up with them in the following year.

By-and-by I will take the liberty of sending you a sketch of this system also, and will only add here that the above fire-beds, as shown by the following sketch, instead of six retorts, will contain eight of them. They will require, for firing, about 30 per cent. of coal less than those of the earlier and usual method, and labour itself will be considerably reduced, because the generator is to be replenished with coal only every five or six hours. Further, it has been said hitherto, and, strange to say, very often, by renowned chemists, that a high temperature in retorts causes, or favours, the formation of the so noxious compositions of sulphur, more especially sulphuret of carbon. Other chemists, especially Dr. Odling, thought that the production of sulphuret of carbon takes place during the latter part of the distillation of coal, because then the pyrites enclosed in coals melts, and through the already formed cokes becomes decomposed, according to the formula—

$$2\,Fe\,S_2 + C = 2\,Fe\,S + C\,S_2$$

(See paper read by Dr. Odling before the British Association of Gas Managers, June 10, 1872.)

This last opinion seems to be right according to experiments made on the Continent; as I have said, that the latter time of carbonizing with us is abridged, and the temperature is kept very high, so that the distillation is finished in the shortest time.



SECTION THROUGH A, B.

It is a fact that both in Germany and in France gas is generally purified almost exclusively by oxide of iron, even when English coals are carbonized, and notwithstanding there is less, and very often much less, sulphur in gas, than in England, where they commonly work at lower temperature, and the purification is brought about more by hydrate of lime. This circumstance can be explained only as I have said already, by the temperature of the retorts in the former countries being very high. The time of distillation is thereby shortened, and the formation of the composition of sulphur, and chiefly sulphuret of carbon, is prevented.

One of the most celebrated gas engineers of the gas-works in Paris wrote to me, not long ago, about this matter, and on the sulphur which is contained in Paris gas—where gas is purified in the very same manner—by oxide of iron, and that to inquire after sulphur there would be "*chercher la petite bête*," because in several investigations it was found to be 33 milligrammes per cubic mètre = 0·03 gramme, which is not worth speaking of. No more sulphur was found in gas at Breslau; per cubic mètre = 40 milligrammes = 0·04 gramme (*Journal für Gasbeleuchtung*, No. 1, 1876). At Berlin, where the investigations for sulphur regularly take place by Dr. Tilftrunk, they never found more than 0·23 gramme per cubic mètre; that is, less by half than the Gas Referees in London permit.

I should be very glad if some of my brother managers would try the retort-setting before mentioned, according to the system of Oechelhäuser, and prove for themselves the practicability of the same; further, I leave it to chemists to examine and to sanction by science what practice has shown to us to be good and profitable.

CONRAD VOSS, Engineer.

Krakau in Galicia, Dec. 31, 1876.

THE EXPLOSION OF A GAS-METER.

SIR,—As the explosion referred to in the JOURNAL of the 2nd inst. has excited considerable interest among a number your readers, may I be allowed to inquire if "S. E." can reply to the following queries?

1. Can any one attest that the gas from the jet referred to continued to burn steadily, or grew fainter and fainter until the explosion occurred?
2. Is it possible that, from repair of mains or service-pipes, or any other cause, the gas may have been turned off from the street that day, previous to the lighting of said jet?
3. What distance may the shop be from the gas-works?
4. Is it possible that oxygen gas may have been made or used in the neighbourhood of the shop on that day?

R. F.

Parliamentary Intelligence.

GAS AND WATER BILLS, 1877.

During last week the Examiners continued their sittings, and found the Standing Orders had been complied with in respect of the following unopposed petitions for bills:—Carshalton Gas; Limerick Gas; Waterford Gas; Southend Gas; North Cheshire Water; Dundee Gas; Warrington Corporation Gas; Blackburn Borough Gas, Water, and Extension; Ashton-under-Lyne Gas; United General Gas Company (Limerick); Newcastle and Gateshead Water; Dukinfield and Denton Local Board of Health; Alliance and Dublin Consumers Gas (Bray Supply); Newcastle-under-Lyme Borough Extension and Improvement; Wakefield Improvement; Falmouth Water; Hanley Corporation Gas; Longton Corporation; Leeds Improvement; Sunningdale District Water; Crystal Palace District Gas; London Corporation (Various Powers); North Dock Ward (Dublin) Gas; Kent Water; Tudhoe and Sunderland Bridge Gas; The Gaslight and Coke Company; West Surrey Water.

The only opposed petition before the Examiners last week was that for the East Worcestershire Water Bill; but the Standing Orders were declared to have been complied with.

A memorial complaining of non-compliance with the Standing Orders in respect of the petition for the Dublin Improvement Acts Amendment Bill was presented from John M'Evoy.

GAS EXPLOSION AT STAINES.—Last Wednesday afternoon a man named named Charles Timlick, aged 34, was killed on the spot by an explosion of gas at the West London District Schools, between Ashford and Staines. He was employed at the gas-works on the premises, and was at the time engaged alone in doing something to one of the purifiers, when a loud explosion was heard, and the man was discovered dead, with the top of the purifier on one of his legs. It is supposed the accident was caused by deceased striking a light and omitting to shut back the gas by closing the valve. The deceased was a married man, with a family.

SUFFOCATION BY GAS.—A fatal accident occurred on Wednesday last at Ashenhurst Works, Blackley, belonging to Messrs. Cowlishaw, Nicol, and Co., manufacturers of embroidery, furniture trimmings, &c. The firm make the gas used on their own premises, and employed a man named James Smethurst as gas-maker. Shortly after ten o'clock on Wednesday morning, Smethurst was seen in the gas-house cleaning one of the three cylinders, and putting fresh lime for purifying purposes into it. Two hours later a man named Jackson visited the house, and found Smethurst lying dead upon the floor, having evidently been suffocated by gas. It was his duty to shut it off so as to prevent it escaping through the cylinder while the latter was being cleaned; but when Jackson entered the house the gas was issuing from the cylinder. There was a slight bruise under the deceased's left eye; and it is believed that this was produced by the unfortunate man falling when he first became unconscious. —*Manchester Examiner.*

CONNAH'S QUAY GAS AND WATER COMPANY, LIMITED.—This company have just been formed. The capital is to be £15,000, in 1500 shares of £10 each. In their prospectus the directors state that the water supply of Connah's Quay at present is obtained from wells, pumps, &c., and only in small quantities. The Local Government Board have called upon the inhabitants to obtain a proper supply. The statutory powers of the company render available to the locality the plentiful supply from the Broad Oak Brook, the quality of which is proved to be suitable both for domestic and manufacturing purposes, and the quantity is unlimited. Arrangements have been made to collect it in reservoirs, and the whole of the water will be distributed by gravitation throughout the district. The company have purchased land for the purpose of erecting gas-works, and contracts have been entered into for the construction of the same; also for the necessary ironwork for water-works, and it has been decided to commence operations forthwith.

Legal Intelligence.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

FRIDAY, JAN. 26.

(*Before Vice-Chancellor Sir* JAMES BACON.)

THE ATTORNEY-GENERAL *v.* TOMLINE.

The ATTORNEY-GENERAL (Sir John Holker), Mr. HEMMING, Q.C., and Mr. RIGBY appeared for the War Department; Mr. KAY, Q.C., and Mr. PHEAR for Colonel Tomline.

This was a suit by the War Department against Colonel Tomline to assert the right of the Crown to a small piece of land, situated in the middle of a field belonging to Colonel Tomline, about a mile and a half from Fort Languard, and from which the water supply of the Fort has been derived since the time of Charles I. The plot in question is a rood in extent; is known as Garrison Spring, is unenclosed and uncultivated, and is a dell or hollow with a boggy bottom. The Fort till recently has been supplied by a 1¼-inch pipe from a spring-head at the north of the plot. The War Department have made a fresh spring-head in a more southern part of the plot connected with the old spring by a pipe; they have also laid down a pipe which drew water from a source to the eastward, which is situated on land admitted to belong to Colonel Tomline, and from their new water-head have laid down a 4-inch pipe to the Fort instead of the old 1¼-inch pipe. Colonel Tomline has cut both the eastward pipe and the 4-inch pipe that leaves the new water-head. By this information and bill the Secretary of State for War asked that Colonel Tomline might be restrained from interfering. Each party claimed the ownership of Garrison Spring under a possessory title. Colonel Tomline admitted the right of the Crown to an easement, but denied that there was any right to increase that easement, either by drawing the water from fresh sources or by using a larger duct.

His LORDSHIP, in delivering judgment, held on the evidence that the Crown was entitled to the fee simple in Garrison Spring; that it, therefore, had a right to make its new water-head; it had also, as an easement over land belonging to Colonel Tomline, a right to take the water to the Fort, and by increasing the size of the pipe it had not increased the servitude; but it had no right to tap the new water supply on Colonel Tomline's land. The Crown had, therefore, asked for more relief than it was entitled to. An injunction would be granted except as to the pipe to the east, but as too much had been claimed no costs would be given.

QUEEN'S BENCH DIVISION.

(*Before Justice* LINDLEY *and a Special Jury.*)

CORRIE *v.* MAYO.

This was a new trial, ordered by the Court of Appeal in December last (see report in JOURNAL, vol. xxviii., p. 915), and it occupied the whole of the week before last. The subjoined report is taken from *The Times* of Saturday, Jan. 20. It was an action by the plaintiff, who had been tenant of a house belonging to the defendant at West Clandon, near Guildford, for breach of a covenant in the lease, to supply him with a sufficient quantity of water. On the first trial the jury found a verdict for the defendant, but the case was carried to the Court above, and ultimately to the Court of Appeal, whence it was remitted for a new trial, on the ground that the verdict was against the weight of evidence.

The SOLICITOR-GENERAL, Mr. C. BOWEN, and Mr. KILDAR ROBINSON appeared for the plaintiff; Mr. DAY, Q.C., and Mr. PITT LEWIS for the defendant.

It appeared that the plaintiff, in November, 1873, agreed to take the house from the defendant, on lease, and moved into the house about that time. The lease itself was not executed until the 20th of December, and the covenant, for the breach of which this action is brought, was contained in that lease. The plaintiff having already suffered from the insufficiency in amount of water supplied, means were at once taken on the part of the defendant to obviate that inconvenience. There were at that time two wells on the premises—one, a deep well, from which the water supply was drawn; and the other a shallow well, which, at the time of the plaintiff's entry, was not connected for the purpose of supplying the house. In order to increase the supply from the deep well, on the 28th of December boring was commenced, which was to be carried into the chalk to a considerable depth, and which it was expected would increase the quantity of water that could be drawn from that well. While these operations were being carried on, the shallow well was connected with the house supply, and the plaintiff borrowed from his neighbours in order to make up any deficiency in the amount necessary for household purposes. This boring was completed on Feb. 28, 1874. The boring was carried through various clay strata, and after reaching the chalk at 60 feet below the bottom of the well, was carried on for 15 feet into the chalk. Before and during this time, and subsequently, some of the plaintiff's family and establishment, which amounted to some 20 persons in all, suffered in several cases from sore throats of a very similar type and a very persistent character. His wife, three of his daughters, and two female servants, were affected in this way, while another daughter and two other servants seem to have been in ill-health in other ways. Mr. Corrie and the male servants did not appear to have been affected with those symptoms, from whatever cause they arose; but in April, 1874, the plaintiff's medical man, Dr. Steadman, being unable to account for the persistency of the sore throats in those whom they attacked, suggested the possibility of their being caused by bad water, and took certain samples of the drinking water then in use by the plaintiff's family, which he forwarded to Mr. Ogston, the analyst. Mr. Ogston reported that the water was of a doubtful character, but might improve. This account of the water was communicated to the defendant, but nothing further passed on that subject. There was some correspondence at and after this date, which relates to some of the items claimed as damages, but do not touch on the real issue in this cause —namely, whether the water supplied by the deep well was pure and fit for domestic purposes. Nothing further appears to have passed on that subject until April, 1875, when a complaint as to the character of the water was made, and samples again taken, some of which were forwarded to Mr. Ogston, and others to the defendant, which he immediately despatched to Dr. Corfield to be analyzed. Both analysts again reported unfavourably of the water, although Mr. Ogston found it somewhat better than the sample sent him in the preceding year. It should be remarked as to these analyses, whereas the evidence was that the butler had drawn some samples in the month of April, and Mr. Ogston's report bears that date, it appeared that Dr. Corfield did not receive and analyze these until the 23rd of June; and it was contended by the defendant that such an interval of time between the time of taking the samples and subjecting them to analysis would render untrustworthy the results of that analysis. On learning the state of the water the defendant, however, suggested as a mode of rendering certain the supply of pure water direct from the chalk, that the well should be relined to render any filtration of surface sewage, &c., impossible, if such a possibility then existed. The plaintiff at this time had put the matter into the hands of his solicitors, and about a week elapsed before the defendant obtained permission to commence the work. However, in the beginning of August the process of relining and casing the well was commenced and carried out. The

plaintiff's family, however, had at this time left the house, and the plaintiff finding, as he thought, no improvement in the circumstances, commenced the action against the defendant for breach of covenant on Sept. 30, 1875. At the last trial the lease was surrendered, and the plaintiff had now given up possession, so that the claim was for damages for the breach of covenant and expenses in and about the house, and arising from the circumstances. The points really in issue were whether the water supplied to Tanfield House was bad in quality owing to the insufficient means of supply, and whether it was of a character to have caused the illness which occurred among the members of the plaintiff's family and household, and which, according to his account, necessitated his giving up the house. The case, therefore, turned, first on the way the well was bored in the first instance and the strata through which it passed. The well-sinker, who bored the well, was called concerning this by the defendant, and said that the boring passed first through about 50 feet of various clay strata, then through sand and clay, ultimately reaching the chalk at a depth of 60 feet from the bottom of the well, and the boring was continued into the chalk for a depth of 15 feet. The question arising out of this was, how the organic matter discovered by Mr. Ogston's and Dr. Corfield's analyses should have found its way into the water. The suggestion on the part of the plaintiff was that surface sewage found its way into the well by filtration from above, and so forcing its way, produced the impurities in the water which had the injurious effect on the health of the family as described. As to this, Mr. Milne, a civil engineer and a geologist of considerable attainments, gave it as his opinion that filtration was impossible through strata of clay to the depth described, and adduced reasons in support of his opinion. However, to avert this, if it were possible, the casing of the well was completed on the part of the defendant, and it appeared that if that casing were good and sound it must finally preclude any possibility of surface filtration into the deep well. A second point in issue, therefore, was, whether this work had been executed in such a manner as to ensure immunity from that danger. On this point there was a considerable conflict of evidence, the plaintiff's witnesses saying that the cement of the lining was of an inferior character, and had never been allowed to get hard, and that the work was, in short, so executed that it would not exclude water from the well. On the other hand, for the defendant, the bricklayer who cased the well said that it was made thoroughly sound and water-tight, and every precaution taken; and several witnesses who had seen the well pumped dry since the casing pronounced it to show no signs of leakage. One of these witnesses had, in the course of the week, while the action was proceeding, made holes in the side of the well, and pronounced the casing to be sound and water-tight, and of a considerable thickness. At one time, no doubt, some water had found its way into the bottom of the well while the pipe was closed, as the plaintiff alleged, through defects in the concrete at the bottom; but for the defendant it was said this was occasioned by the loosening of the stand-pipe in consequence of violence used by the plaintiff's servants in putting in and taking out the plugs. Another point at issue between the parties was whether the symptoms developed by those of the plaintiff's household who suffered from ill-health while at Clandon were such as would be occasioned by drinking impure water. On this point Dr. Steadman, of Guildford, who attended the plaintiff's family, expressed his opinion that the type of illness, from its similarity in the several cases, and from its general character, was a probable result of the drinking of impure water, and in this he was supported by Mr. Thornton, surgeon to the London Hospital for Diseases of the Throat, and to some extent by Dr. Corfield. On the other hand, Professor Wanklyn, Dr. Stevenson, lecturer at Guy's Hospital; Dr. Sills, of Guildford; Mr. Haynes Walton, surgeon of St. Mary's Hospital, and Dr. Morell Mackenzie expressed their opinions that impure water would never produce the symptoms detailed by Mrs. Corrie, her daughters, and Dr. Steadman. It was incidentally suggested by these witnesses that the wall paper of the dining-room, being loaded with arsenic, might produce such symptoms, but they were disinclined to attribute them to either one or the other cause. Another point which presented considerable difficulty, was the reconciling of the various analyses made of the water at different times. The analyses made before the casing of the well presented unfavourable features in every case; but for the defendant it was contended that it was not clear that all these came direct from the deep well, or without admixture with water from the shallow well in the pipes through which it came. The analyses, however, presented also a great divergence of opinion even after the casing of the well; Dr. Corfield and Mr. Ogston still reporting unfavourably of the water, while Professor Wanklyn, the late Dr. Letheby (whose evidence was read), and Dr. Stevenson pronounced it very good. It became, therefore, a question for the jury what conclusion they would arrive at from these analyses taken in connexion with the rest of the evidence.

After very forcible speeches by Mr. DAY, Q.C., and the SOLICITOR-GENERAL, on behalf of their respective clients,

The learned JUDGE summed up the case with great care, telling the jury that the questions they had to answer for the determination of this action would be the following:—Had a reasonable time elapsed for the defendant to do the work under the covenant to secure a sufficient supply of water to the house before the action was brought; and if the answer of the jury to this should be in the affirmative, the following question would arise:—Did the defendant within a reasonable time do the necessary work to secure a sufficient supply of water—first in quantity, second in quality.

The jury found a verdict for the plaintiff for £100.

ASTON PETTY SESSIONS.—FRIDAY, JAN. 26.

(*Before Messrs.* SMALLWOOD *and* RYLAND.)

THE CORPORATION OF BIRMINGHAM AND THEIR GAS STOKERS.

William Smith and *William Matthews*, gas stokers, lately employed at the Saltley Gas-Works, each summoned the Corporation of Birmingham for the sum of £3 10s., which they claimed in lieu of a fortnight's notice.

It was stated by Mr. PHILLIPS, who appeared for the complainants, that at six o'clock on the morning of the 16th inst., his clients presented themselves at the works for their usual employment, when they were informed that they would be required to use a scoop which was much heavier than the one they had been accustomed to. The men consulted among themselves on the matter, and they decided to object to use the heavy scoop. The superintendent of the works persuaded them to make an attempt to work with the scoops, but, after trying for 10 minutes, they declined to continue any longer, and left the works, the manager telling them that he would not further employ them.

Three stokers were called, and they stated that the objectionable scoops were above a hundredweight heavier than those they had formerly used.

Mr. HERBERT, for the corporation, denied that the scoops were more than 30 pounds in excess of the weight of the old ones. The men did not give the new scoop a fair trial. He urged that if the corporation were to be at the mercy of men who were allowed to say that they would not perform work which they disliked, no employer would be able to get his work done fairly and properly.

The manager and two foremen stated that the complainants could have used the scoops without any inconvenience; and the magistrates elicited that no notice of the intention of the authorities to change the scoops was given to the men.

An order was made for the payment of the amount claimed, one of the magistrates remarking that the corporation might have avoided these proceedings by giving the men notice to leave when they declined to use the scoops.

LIVERPOOL COUNTY COURT.—TUESDAY, JAN. 23.

(*Before Mr.* P. THOMPSON, *Judge.*)

RATHBONE *v.* THE LIVERPOOL UNITED GAS COMPANY.

This was an action by the plaintiff to recover the sum of £50 for damage done to his carriage through the alleged negligence of the servants of the defendants.

The evidence showed that on the night of the 24th of August last the plaintiff's landau was driven by his coachman to the Edgehill Railway Station, for the purpose of meeting the 11.20 train. After leaving the station, the coachman proceeded home to Greenbank Cottage, a son of Mr. Rathbone sitting on the box next to the coachman, and two gentlemen being inside the carriage. Near to the Croxteth Road entrance to Sefton Park some excavations were being made by the defendants, in order to lay down new gas-pipes, and some of the pipes were lying on the opposite side of the road so that they might be ready for use. The excavations were lighted, but there was no light placed on the gas-pipes. The coachman drove safely past the first light, but after he had got a short distance the carriage came in contact with a pipe which was projecting about 2½ feet into the roadway. The result was that one of the wheels was broken, and the carriage was otherwise injured, the harness having to be cut in order to release the horses.

For the defence it was contended that there was contributory negligence, and, therefore, that the defendants were not liable. The coachman, it was alleged, drove the carriage too fast, and did not take the precaution which he ought to have taken when he knew that the road was obstructed.

His HONOUR thought that the accident arose entirely from the negligence of the defendants, in not having lights placed near to the pipes, or some one to give warning that they were there. The company were, therefore, liable for the damage.

A verdict was then entered for the plaintiff for £50.

SHEFFIELD COUNTY COURT.—WEDNESDAY, JAN. 24.

(*Before Mr.* THOS. ELLISON, *Judge.*)

SHEFFIELD UNITED GASLIGHT COMPANY *v.* HYMAN HYAM.

In this case the Gas Company sued Mr. Hyman Hyam for £16 13s. 2d., alleged to be due for gas and fittings supplied. The defence was that the defendant had filed a petition for liquidation on Nov. 9, 1874, and that he was consequently freed from the debt. It was admitted that the amount had been owing, but that the result of the liquidation proceedings freed him from it. On the other hand, the result of a later meeting of defendant's creditors, held in London, at which a composition of 9s. in the pound was agreed to, was relied upon. After some argument the matter was adjourned until the 31st of January, in order that some additional information might be obtained as to under what particular section of the Bankruptcy Act the proceedings had been registered.

COURT OF SESSION, EDINBURGH.—TUESDAY, JAN. 23.

(*Before Lord* CURRIEHILL.)

EDINGTON AND SONS *v.* THE DUNDEE WATER COMMISSIONERS.

This is an action at the instance of Thomas Edington and Sons, engineers and ironfounders, Glasgow, and D. Y. Stewart and Co., engineers and ironfounders, Glasgow, against the Dundee Water Commissioners for payment of £22,733 3s. 4d., and between £1800 and £1900 in name of interest. They aver that the sum in question is the balance due to them under certain contracts for the construction of the works necessary for bringing in a water supply from Lintrathen to Dundee, and also for supplying the piping for the purpose; and they further claim £2500 as damages, on the ground of alterations which entailed delay in the completion of the works, and caused loss to pursuers. Defenders maintain that pursuers are not entitled to claim any sums for alterations and additions, except as authorized in writing by the commissioners or their engineer. It is also alleged in defence that some of the pipes were defective, and in the course of the works several of them burst. There were other mishaps which are attributed to the negligence of the pursuers, who, it is said, abandoned the contract before it was completed. In respect of loss and damage, the defenders say they have counter claims which compensate and extinguish any claim competent to the pursuers. Parties were to-day ordered to revise the record.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

THE ALLEGED NUISANCE AT THE FULHAM GAS-WORKS.

At the Meeting of the Chelsea Vestry, on Tuesday, the 23rd inst.—Mr. KINGSBURY in the chair,

The following letter, addressed by the Gas Referees to the solicitors of the board (Messrs. Lee and Pemberton), was read:—

"Gentlemen,—We have given careful consideration to the statement in reference to the nuisance occasioned to the parish of Chelsea by The Gaslight and Coke Company's works at Fulham, which accompanied your letter to us of Nov. 11, 1876.

"We have also paid several visits to the works in question, and have watched the process of discharging the lime purifiers and conveying away the refuse lime. The arrangement in use for the last-named operation, by which the refuse lime is kept constantly under cover, from the time when it is lifted out of the purifier till the loading of the barge in which it is removed has been completed, seems to be good, and to be carefully carried out. We believe that no nuisance is caused during the operation.

"The process used for emptying the purifying-box has been recently improved by the introduction of a plan which Mr. Evans, formerly the engineer, and now a director of the gas company, states that he employed successfully before the discovery of the use of oxide of iron as a purifying agent, to prevent nuisance arising from the refuse lime. Before the lid of the purifier is raised, air is drawn downwards through the vessel, and thence expelled through a large brick trough filled with oxide of iron. By this means both the 'foul' gas which filled the purifier is rendered innocuous before it is allowed to escape, and also the sulphuretted hydrogen which the lime gives out, especially when in a moist condition on its first exposure to the air, is arrested.

"Our observations, however, at Fulham and at other works lead us to believe that the principal source of the nuisance which is liable to arise from purification by lime is not a gaseous effluvium, but the refuse lime itself, which exists when in a dry condition as an exceedingly fine dust. Where, as at Fulham, the purifiers are not enclosed, but stand in the open air, and their contents are exposed to the wind while being

trodden upon by the workmen, and shovelled into bags, this dust arises, and is carried away so abundantly that the clothes of a person standing at some distance to leeward are thickly powdered by it, and acquire a more persistent smell than would be caused by exposure to gaseous effluvium. It is to this dust, carried, as it easily may be, to distances of a mile or more from the works, that the nuisance complained of in Chelsea is probably due.

"The remedy seems obvious—namely, either to enclose the purifiers so as to shelter them altogether from the wind, or to lay the dust by watering each layer of lime, sufficiently to damp it through, before it is stirred by the workmen. This latter process, as being more immediately applicable, we have recommended to the superintendent of the works, advising also that he should employ the down draught of air suggested by Mr. Evans, not only previous to the raising of the lid, but also throughout the operation of emptying the purifier. We have also recommended that the labour of emptying should, as far as possible, be so systematized, that the workman should deal successively with the different sections of each layer, keeping covered over the remaining sections; this plan has the further advantage of concentrating the down draught of air upon that area on which the lime is being disturbed.

"Our recommendations have been adopted by the company, and the mode of working just described has been in use for the last two or three weeks. During this time we have thrice visited the works, and we believe that if this mode of working is carefully adhered to, no further nuisance will be occasioned.

"It must, however, be borne in mind that purification by lime is not the only operation in the manufacture of gas which gives rise to unpleasant smells. On the occasion of our last visit to the works, on the 10th inst., the superintendent stated that some complaints had been made to him recently; but he also mentioned that he had recently emptied a large scrubber (a vessel through which the gas passes before it enters the purifiers) charged with the coke, which had become clogged with the tar and other impurities removed from the crude gas.

"We would say, in conclusion, that, although it is undoubtedly easier to conduct the less complete purification of gas by means of oxide of iron, without occasioning nuisance, than so to conduct the more complete purification by means of lime, we believe the latter to be practicable, if proper arrangements are made, and sufficient vigilance is exercised.

"It is not our province, neither are we in a position, to give to the company such engineering or chemical advice as they need to discharge properly their responsibility in this matter; but we can see far enough into the question to make us believe, what the vestry of Chelsea express as their hope, that 'some method might be found of obviating the nuisance without sacrificing the purity of the gas.'

(Signed) "A. Vernon Harcourt, William Pole, } Two of the Gas Referees."

The Surveyor (Mr. G. Stayton) said at twelve o'clock that morning at the wharf the nuisance was as bad as ever.

Mr. G. W. Richards remarked that it could hardly be the dust which caused the nuisance, as, for a long time there was a vapour noticed coming before the wind.

Mr. Lawrence said it was a well-known fact that there was a smell observed in rooms where dust could not penetrate.

Mr. Cross observed that the smell from the gas was very bad that morning at seven o'clock.

The letter was referred to the Gas Analyst (Dr. Barclay) for report.

Camberwell Vestry.—At the meeting of the vestry, on Wednesday last—Mr. Turner in the chair—the clerk reported that, with reference to the sum of £600 advanced to him by the vestry to pay costs incurred in opposition to the gas bills last session, he had paid Messrs. Simson and Co., the parliamentary agents, their accounts, amounting in the aggregate to the sum of £561 2s., for counsel's fees, &c., and had paid the balance of £38 18s. into the London Joint Stock Bank. Some complaints were made respecting alleged increases in consumers bills, notwithstanding a reduction in the price of gas per 1000 feet, and the chairman stated that as he was charged by the Surrey Consumers Company £9 8s. for 21 days consumption of gas, he had the meter changed, and the result was that his next account was £7 17s. 3d. for 75 days consumption of gas. He considered this so unsatisfactory that he should not pay the amount. As the company's price had been reduced, so the charges to himself had gone up. A letter was read from the clerk to the Lewisham Board, asking the vestry to co-operate with that board in opposing the Crystal Palace District Gas Company's Bill, to be introduced into the next session of Parliament, which sought to relieve them from any restraint as to the quantity of sulphur in their gas other than sulphuretted hydrogen, which letter was submitted to the vestry for their consideration. The communication was referred to a committee.

RICHMOND WATER SUPPLY.

A Public Meeting of the Ratepayers of Richmond was held on Friday evening last, in the Freemasons Hall, at the Greyhound Hotel, "to discuss the position of affairs, and the policy of the Richmond Select Vestry and the Southwark and Vauxhall Water Company." The meeting was called for eight o'clock, but long before the commencement of business the hall was crowded in every part, and great excitement prevailed; indeed, the whole proceedings from first to last were of a very tumultuous character. Yells, hisses, groans, and cheers prevented anything being done for a long time, and it was fully three quarters of an hour before the first formal resolution could be moved.

Mr. Lockwood was called to the chair at the outset, and, after a few remarks, he proceeded to read a letter from the water company's engineer, but the interruption was so great that he found it impossible to do so. The meeting was determined not to hear him, although appealed to by Mr. Gascoyne, a member of the select vestry, and assured that the chairman was not a shareholder in the company, and that the meeting had not been called at their instigation. As it became evident that Mr. Lockwood would not be listened to, that gentleman at length vacated the chair, and left the hall.

After a considerable time further had been wasted, a resolution was come to, on the motion of Mr. Gascoyne, seconded by Mr. Druce, that Mr. F. G. B. Trevor, a churchwarden, and a member of the select vestry, be requested to preside.

Mr. Trevor, in taking the chair, said he only consented to do so on the understanding that some attempt would be made to preserve order. He appealed to those present to listen to whatever remarks were offered by speakers on both sides of the question, and then to express their opinions, for or against the resolutions to be submitted, according to their judgment. As a member of the select vestry he feared nothing, and only asked the meeting, before condemning them or any one else, to hear what they had to say in their own behalf.

Mr. Druce then came forward to propose—"That this meeting, while duly sympathizing with the vestry in their efforts to provide an ample supply of pure water, as promised in their circular of Dec. 28, considers that the time has now arrived when they should make an immediate arrangement for an adequate supply of water from some reliable source, the sources of supply at present relied upon having proved absolutely insufficient, and having occasioned much inconvenience and distress." He said he was a ratepayer and nothing more, and he had, in common with others, suffered inconvenience from the discontinuance of the supply of water by the company. On hearing that the present meeting had been called, he stated that if it was to be an "indignation meeting" against the vestry he would not be present; but he was assured it was not so intended, and therefore he consented to come. And if any one thought the motion he had made was expressive of a want of confidence in the vestry, he could only say he took a different view of the case. He believed the ratepayers sympathized with the vestry, who had been placed in a most difficult position by the action of the company. He had taken some trouble to ascertain the facts of the case, and he believed them to be this: For a period of 16 years the company had supplied Richmond with water, and then they took advantage of a technical legal right to do a great moral wrong. And if any one could be found bold enough to uphold such conduct, he could only say he should be sorry for that man. Of course a trading company would not willingly submit to have a rival concern come in and take away their business all at once. But did the vestry wish to take away the business of the company all at once? What were the facts? Up to 1870—*i.e.*, ten years from the commencement of their operations—no fault, at least no material fault, was found with the supply of water by the Southwark and Vauxhall Company. But in the year 1870 the first step as taken to obtain a better supply of water for Richmond, and what was that first step? It was an overture made to the company to go to Parliament and obtain powers to supply the place with water. They refused to do it, and the local authority then very properly said: "Will you sell us your pipes and tackle?" Not a bit of it; they treated the vestry with defiance, and this was the tone they took from the beginning. The vestry then went to a great expense in obtaining a Local Government Board Inquiry, of which the company had notice, but would not in the first instance attend. The inquiry was re-opened in November, 1874, and continued until the month of April, 1875, and throughout this second inquiry the company were present, and were heard. Could any one say they had not had fair play? They had had more than fair play, they had had forbearance shown to them. The Local Government Board gave the vestry power to raise £28,000, but the company then introduced a bill into Parliament, and brought an action in the Court of Chancery to restrain the vestry from proceeding with their application. The motion stood over until the result of the company's bill was known. What was that result? The bill they themselves brought in was withdrawn by themselves. But when was it withdrawn? Not until they had put the vestry to the utmost expense possible, short of taking them before a select committee. Then came on the trial of the action in Chancery, and the company were there ignominiously beaten, and their bill dismissed with costs. (A voice: "They put us to £2000 expenses.") That was on the 23rd of March, 1876; but for six months afterwards the company did not move in the matter. Had they sent out a circular to the ratepayers intimating that, in consequence of the proceedings of the vestry, they would decline after a certain period to supply the town with water, except under a new contract, he would have exonerated them from blame. That would have been the right course to take. But they let things go on, and he (Mr. Druce), in blissful ignorance of their intentions, paid his water-rate like a ——, and then one day he found the water to his house entirely cut off. Under the circumstances of the case, he thought the vestry were right to look upon the company as enemies, and to treat them at arm's length. He was not prepared himself, in the absence of all the facts as to what transpired between the vestry and the company, to say that the former had acted in every way as he could wish. It struck him, as an outsider—but here he spoke under authority—that it would have been more politic on the part of the vestry rather to have held out the olive branch; they might have tried, even if not successful, to have adopted some conciliatory policy. Still, he could hardly blame the vestry for not having done it, remembering how the company had treated them from the beginning. Some one in the meeting seemed to think that the vestry should have applied for an injunction to restrain the company from discontinuing the supply to the town. But the vestry were advised on this point; they took counsel's opinion upon it, and he (Mr. Druce), as a Chancery lawyer, having looked into the matter, entirely agreed in the opinion given to them, that if they had applied to the Court of Chancery they must have been beaten ultimately. It was, however, one of those cases in which "a risky action" might have been tried, in which advantage is taken of the technicalities of the law to obtain delay, but they were too honest and outspoken John Bulls for that; they could not "come the Artful Dodger" enough. The vestry were asked to pay compensation. For what? For the company continuing to do a wrong. He never heard that being paid to commit a wrong made the wrong a right. At the same time he would have suggested to the vestry, on that occasion, to go to the company and tell them that although it was certain they had done wrong in supplying the parish, for the past 16 years, with water, there was no one to find fault with them if they continued for a little longer to do that which was evidently beyond their power. In fact, the only persons who could have taken exception to their proceedings were the Conservators of the Thames, who might have objected to the company drawing more water from the river than they required to supply their own proper district. And assuming the company had agreed to do this technically legal wrong, the vestry might have offered to indemnify them against any claims made upon them by the conservators. The company knew they were not acting rightly, or they would not have come to Richmond "like a thief in the night" to break off the connexions between their mains and the service-pipes of the consumers. He would sum up their conduct by saying it was scandalous, vexatious, and spiteful. It was scandalous to deprive a town of 20,000 inhabitants of their water supply at a month's notice. And it was purely vexatious and spiteful on their parts, because if they had continued the supply until the vestry were ready to take it up, they would have derived a benefit to their own shareholders, of which by their action they had deprived them. It had been stated that the capital of the company in Richmond was £60,000, but he did not believe it. The capital of the old Richmond Company was between £7000 and £8000; but he would assume that the Southwark Company gave £16,000 for the undertaking, and that by the extension of the town further capital had been required, and it was now £20,000—or he would go further and double that amount—say it was £40,000. The income they received from the supply of water to the town was £7000 a year. Was not that a good return on an investment of £40,000? All he could say was that if he were a shareholder of the company, which he was happy to say he was not, he would make it "extremely hot" for the directors at the next general meeting of proprietors. Under all the circumstances, he should ask the present meeting to pass unanimously the resolution he had proposed.

Mr. Munro hoped the words at the end of the motion, "and distress", would be omitted.

Mr. Druce objected to the suggestion, and said the vestry ought to be made acquainted with the exact state of affairs, and he was sure they would not take this resolution as a vote of want of confidence. He had suggested to them, through Mr. Gascoyne, that they should lay before the ratepayers a report of what they were doing. He had heard it stated that

the only sources of supply at their command were two, one at the bottom of the cemetery—— (Interruption.) He did not say that the water came from the cemetery, but it came from close to the cemetery, at the lower end of the lane—— (Renewed interruption.)

The CHAIRMAN said he thought there was a misapprehension in reference to Mr. Druce's statement. Mr. Druce did not mean to say that the water drawn from that part came from the cemetery; he simply stated, as a matter of fact, that the water came from outside one portion of the cemetery, underneath the freeboard—he did not say that the water percolated from the cemetery.

Mr. DRUCE said, so far as his observation went, the water appeared to come from Richmond Park. It was the stream he had always noticed as supplying two large ponds, where a dairyman of the town kept a very large herd of cows—— (Laughter, hisses, and cheers.)

Mr. DRUCE said the meeting seemed to think he was "chaffing" them—but he was not. He did not mean "the cow with the iron tail." He mentioned the fact of the number of living cows being kept near the pond, as proving to those who knew anything of agriculture that there must be a good supply of wholesome water in the neighbourhood, for cows could not thrive without it. The other source of the vestry's supply was near the "Star and Garter," which he was told was the surplus water after the supply to the White Lodge. There were, he believed, three other supplies down the town; but the question he would put to the vestry was, "Are these sufficient in the present crisis?" (No, no.) They were insufficient, and the want of others had, as stated in the resolution, occasioned inconvenience and distress. No doubt all this could be remedied, and would be remedied by the vestry, which had already done so much; but it was time that the inhabitants of the town were made acquainted with the fact of what they had to depend upon in permanence. As to the "distress" from the present state of things, he knew but little of it himself, but the medical men, who were accustomed to visit among the poor, assured him of its existence; therefore he thought the word should not be left out of the motion.

Dr. ANDERSON seconded the motion. He disclaimed any feeling of hostility to the vestry, and declared that he merely came forward to offer, as a medical man, a few remarks in support specially of the latter part of the resolution. There could be no doubt of the fact in the mind of any one who went through the town, that a certain amount of inconvenience and distress did prevail. The medical men of the town had that day signed a document, which was to the following effect:—

As unfavourable statements have been current respecting the health of Richmond, we, the undersigned, practising in this town, beg to report that for some time past the mortality has been very low, that there is no epidemic prevailing, and we subjoin a list of the total number of cases of zymotic diseases under our own care at the present time. Notwithstanding the healthy state of the town, we are fully alive to the necessity of obtaining an ample and pure supply of water with as little loss of time as possible, and we strongly recommend that an immediate analysis of the water supply to the inhabitants from all the sources in use should be obtained and published, and that the analysis should be repeated from time to time.

(Signed) FREDERICK CHAPMAN, A. K. MAYBURY, M.D., N. ARCHER WARWICK, M.D., THOMAS DUNCAN, M.D., W. A. F. BATEMAN, WM. ANDERSON, M.D., J. FERGUSSON, Surgeon, &c., FREDERICK J. WADD, M.B., WILLIAM YATES, Surgeon, &c.

The list showed one case of small-pox, but none, it would be seen, of typhoid fever, scarlet fever, measles, or diphtheria. In the present crisis something ought to be done. He would merely add that there was inconvenience and distress, and that if the present state of things continued, there was probability of future disease, and, perhaps, great danger in the town. No doubt, also, many people would leave the town if this state of things continued.

Dr. SELLE said his course for many years in the vestry had always been to secure the greatest happiness for the greatest number, and he could assure the meeting that he and his brother vestrymen were now earnestly engaged in securing for the people of Richmond a pure and abundant supply of water. In talking of analyses, Dr. Anderson had quite forgotten to refer to the analysis of the water supplied by the Southwark and Vauxhall Company. He asserted that there was more water in the town that day than there had been the day before, and they were obtaining more and more every day. When they got to the proper depth with their artesian well—they had it on the authority of one of the most eminent engineers—there would be 300,000 gallons of water per day at their disposal. (Cheers and dissent.) He did not like the last part of the resolution, and was of opinion the word "distress" should be left out, and "inconvenience" should be substituted. (Interruption.) He had himself been round with the water-carts in the lower parts of the town, to assist in giving water to those who needed it, and he had himself pumped water into the carts. Hitherto the vestry had been beaten in their operations by the weather, and two of their men had been laid up with rheumatic fever. Notwithstanding everything, he proposed that the word "distress" should be left out of the resolution.

A person in the body of the hall called upon Dr. Selle to produce the analysis of Dr. Rowland, the medical officer of health, showing the quality of the water now being supplied to the town.

Dr. SELLE said he had not brought it with him; it could be seen next day. He moved as an amendment to omit the words "and distress."

Mr. MUNRO seconded the amendment.

Dr. ANDERSON said he was personally responsible for the word "distress," and he ventured to say that, instead of being too strong, it was not strong enough. He had been himself a witness of that distress. He did not want to exaggerate it, and create a panic, because he believed the town at the present moment was very healthy; still, it must be remembered that diseases of this kind and order were very insidious, and took some time to develop themselves. But they even now existed.

Mr. GASCOYNE: From this water?

Dr. ANDERSON: Yes. One word more and I have done. Dr. Selle has spoken of the analyses by Dr. Rowland. I am not an analytical chemist like him, and I wish to speak with all respect of him; but I and my friends have a rough-and-ready method of testing water. This method we have applied to the water at present furnished, and we find it is slightly impure. ("Hear, hear," and interruption.)

Mr. GASCOYNE: I am surprised at such a statement from Dr. Anderson. (Interruption.) Dr. Anderson's partner told me that nothing could be discovered out of twelve or sixteen tests of the water. (Renewed interruption.)

Dr. ANDERSON: I deny it, and I will produce my partner to contradict it. (Cheers and hisses.)

Mr. GASCOYNE: I trust the meeting will not pass the resolution in its present form. I know my poor neighbours as well as most people, and I am sure they would be ready to suffer inconvenience in support of the vestry. For gentlemen like Mr. Anderson to come forward in this way—I am ashamed of him. (Hisses, cheers, and prolonged interruption.) I move that the resolution be withdrawn altogether. (Laughter, and "You cannot deny facts.") The former part of the resolution does not do harm, but the latter part will hamper the committee so that they cannot act. (Hear, hear.) Do the gentlemen mean that we are to go back to the old works? ("Hear, hear," and interruption.)

Mr. DRUCE: I beg to say I did not mean it.

Mr. GASCOYNE then moved, and Dr. SELLE seconded, as an amendment, to omit from the resolution the whole of the latter portion, leaving it to stand thus—"That this meeting fully sympathizes with the vestry in the efforts made by the Water Committee to furnish an ample supply of pure water, as promised in their circular of the 28th of December."

After a scene of confusion which lasted some minutes, the CHAIRMAN proceeded to put the question, and, on a show of hands, he declared both amendments to be negatived.

The original motion was put and carried by a large majority.

Captain M'DONALD then moved—"That, apart from the legal rights of the question, the action of the Southwark and Vauxhall Company, in cutting off the supply of water from the town of Richmond—being unnecessary as far as their pecuniary interests were concerned—was a vindictive measure, prompted by animosity towards the Richmond Vestry, they having undertaken to find us a better supply, and was unworthy of any body of Christian men placed in a responsible and public position, and dealing in such a commodity as the supply of water to a town; further, that such arbitrary action urgently calls for the intervention of Parliament to prevent the like occurrence in some other locality." Water companies, he maintained, were not established for their own gain; parliamentary powers were granted to them to meet the necessities of the public. In the present case, let the legal merits of the question be what they might, the company had, by the course pursued by them, deprived the inhabitants of the town of the supply of the primest necessary of life. He would not go into the merits of the question as to whether the vestry had acted right in every particular. It was very easy to find fault with a public body, and they should bear in mind that in the composition of the Richmond Vestry there were many able men who worked hard for the interests of the ratepayers—— (Laughter and cheers.) He believed they were doing their utmost to supply pure water to the town at a moderate cost, and it was only on the 9th of the present month that the Water Committee were thanked for their action in the matter. That vote of thanks was, perhaps, a little premature, but still he believed that that body had devoted all their energies to meet the emergency. They were not the persons who had cut off the water from the town, and all the resolutions passed that day would not benefit the inhabitants on the morrow. Practically speaking, they were in the hands of the vestry for good or evil. That body were doing all they could in the matter, and therefore he would say, be generous—don't pass any resolution which might embarrass those who are acting for the common good. They could not obtain anything by finding fault with those who at the present time were their purveyors of water. (A VOICE: Don't offend the company, we may want them again.) Let them turn from the vestry to those who were the cause of all their misfortunes. In the Registrar-General's return, published this month, it was shown that many of the London water companies supplied water unfit for domestic use, and, figuring amongst the worst, they found the Southwark and Vauxhall Company. Should they not thank any body of men who were taking them out of the power of such people. It was all a question of money. If the company could have extracted £2000 or so out of the pockets of the ratepayers for so-called compensation, they would still have the water. He therefore asked them to condemn *in toto* the arbitrary, unjust, and unchristian action of the company, which might have been productive of the most mischievous results, not only to Richmond, but to the hamlets, if they had been visited with sickness, fire, or pestilence.

Mr. MUNRO seconded the motion, which was put and carried almost unanimously.

A vote of thanks having been given to the chairman, the meeting, which had been very tumultuous throughout, broke up about ten o'clock.

CORPORATION GAS AFFAIRS AT WIGAN.

On Monday, Jan. 22, a Meeting of Gas Consumers, convened by circular, was held at the Royal Hotel, Wigan, to consider what steps should be taken with a view to reduce the excessive price charged by the corporation for gas in the borough. The chair was occupied by the Rev. P. HAINS, and upwards of sixty tradesmen were present. We copy the report of the proceedings from the *Wigan Observer*.

The CHAIRMAN having introduced the business, called upon Mr. Edwardson, a member of the corporation, by whom the meeting had been convened.

Mr. EDWARDSON said those present would be aware that in the previous week he took the trouble to go round the market-place to ascertain the amounts of the last quarter's bills, and the corresponding quarter's of last year. The result of that inquiry revealed to him the fact that in many cases the increase in price was 100 per cent., in some 50 per cent., and in others 15 per cent., and even lower, but the average increase was something over 15 per cent. That seemed to him a very great increase. Whether the Gas Committee were justified in making those charges he was not prepared to say definitely, but he was inclined to believe they were not. He understood the authorities said that the extra pressure put upon the mains was the cause of the increase; but if that were the case, he wanted to know why the increase was not the same proportionately in all cases. He thought the Gas Committee or the gas manager should be called upon for a reply. It was estimated that each burner burned about 3½ or 4 feet of gas in an hour, but if they examined their gas bills they would find they were charged for consuming gas at the rate of 9 feet per hour. He was not a practical man, and therefore could not say much on the subject, but he knew there was a difference between £5 and £10. It was rumoured there was an air-injector machine in use at the works, for the purpose of forcing air into the gasometers, and from there into the mains and service-pipes. Those were questions which they ought to put before the Gas Committee, to ask them how they could explain them to the satisfaction of the gas consumers, and, of course, the ratepayers. That was all he had to say at present on the question, and he thought they had good ground for asking them to explain the cause of the large increase. He was not prepared with a resolution, but probably he would be before the close of the meeting.

Mr. J. FAIRHURST said his last quarter's bill was £3 10s. over the corresponding quarter of last year.

Mr. M'CLURE said that Messrs. Evan and M'Clure's gas bill for the last quarter was £19 7s. 11d. as against £11 11s. 3d. in the corresponding quarter of last year. He might tell them this increase in the gas bills was not confined to Wigan, for at Earlestown, where his firm had also a place of business, their gas bill was exactly double what it used to be.

Mr. T. R. PART said it was the same at Hindley.

The CHAIRMAN said there were times when it was best for them to confine themselves to their own businesses, and in this case they would be attending to their own interests if they were to confine themselves to Wigan.

Mr. M'CLURE said he would bow to the chairman's decision, but he might mention that in the town of Dundee, in Scotland, the gas was double the price of gas in Wigan, but the gas bills were considerably smaller for the amount of time the gas was burned. The gas there was, he believed, made more pure, and it was in the long run cheaper, though it was double the price per 1000 of the Wigan gas.

Mr. GEE said when he got his bill he was so astonished at the price—55 per cent. in advance of the corresponding quarter—that he sent it back to

the gas manager with a note, requesting him to inspect his pipes and meter, as evidently a mistake had been made in some way or other. They, however, had never deigned to reply to his note.

The CHAIRMAN: When did you send it?

Mr. GEE: A fortnight or so ago.

Mr. RIDER said for his shop in the market-place the bill for the 1875 quarter was £1 19s. 2½d., and for the last quarter £4 19s. 9d.

Mr. S. PART: Mine is less than the corresponding quarter in last year.

Mr. BEST: Mine is £4 more than the corresponding quarter in last year.

Mr. S. TAYLOR said his bill had increased 37½ per cent. notwithstanding that he had burned less gas than in the previous quarter.

The CHAIRMAN (examining Mr. S. Part's bill): But if you will examine it you will find there are 12 days short in one of the quarters, and that may make a difference.

Mr. A. BIRKETT said his bill had increased between 40 and 50 per cent. His bill was £5 2s. 4d. against £3 14s. 4½d. What puzzled him was the want of uniformity in the gas charges. For instance, he had 36 burners, and a neighbour of his who had only seven burners had an account sent which was about the same as his (Mr. Birkett's) 1875 bill.

Mr. EDWARDSON: Thirty-six jets, £5 2s. 4d. I have 25 in my shop, and my bill is £8. I have actually fewer burners than I had last year, and yet my bill has increased 75 per cent.

Mr. S. TAYLOR: I have 20 burners for £8 10s.

The CHAIRMAN said it appeared strange that there is such a unanimous feeling throughout the town. A good many families in private houses had particularly enjoined upon him to give expression to their feelings on the subject. The gas bills had been so enormously large that he had heard of no other feeling in the town but one of surprise almost bordering on indignation because they thought something like imposition or fraud had been practised upon them. He had heard that frequently in the town that day.

Mr. J. FARRINGTON, Wigan Lane, said in the 1875 quarter his father's bill was £1 9s. 6d., and at that time he wondered whether the price of gas had been raised, so much higher was it over the corresponding quarter in 1874; but they might imagine his surprise when last quarter he discovered it was £2 4s. 5½d. He could not account for the increase.

Mr. SMALLMAN said he had not to pay for the gas he consumed, so that he did not know anything about the charges; but, notwithstanding he had five burners in his room, he knew that when he wanted to read he had to light a couple of candles.

The CHAIRMAN said his experience with the Gas Committee hitherto, with the exception of the last few months, had always been a happy and pleasant one—that was to say, he had had very little to do with them, and the bills he had had to pay had been exclusively confined to his schools. The gas bill for his house at Thornhill he had had no reason to complain of; but as regarded the vitiation and depreciation of the gas, he was far from satisfied. Since the works had changed hands, it appeared to him there had been a twofold failure. First, the gas had been greatly vitiated. What kind of air passed through the pipes, it was not for him to say; but he believed there was something else than ordinary gas. Besides that, the bills had enormously increased. What Mr. Smallman said about the gas, although they laughed at it, was a fact. He was sure that had St. George's Church been lighted with candles last Sunday night, it would have afforded the members of his congregation a better light than the one they had. So bad was the light that it was hardly possible for them to read an ordinary book with it. In addition to that, the gas supplied them was of the most vitiated description. That being so, he had of necessity to illuminate the church materially as well as spiritually; with the material light that came out of his pocket in the same way as the other light came from his mind or head. He would now say a few words with regard to the school. During the summer months, from April to June, they had no gas in the schools, but recently a bill came in for £1 16s. He went to the gas-works to ask them when the gas was used, and told them they had had neither concerts nor meetings, and that in fact he could not discover the gas had even been lighted once. After some investigation, however, he found out that it had been lighted on one occasion, and that gas to the value of about 2s. had been consumed. He went to the gas manager on the subject, and told him it was an imposition; and, to tell them the truth, the gas manager spoke very candidly, and said he was afraid some of the collectors did not read the meter registers—that they charged the public not according to what they consumed, but according to what they ought to have consumed. After this he extended his investigations, and found that one of his parishioners had had a dispute with the gas company, and that she would not pay her bill. The consequence was her gas was cut off, and she had to resort to paraffin lamps, which she found to be a very agreeable change; but the next quarter she received the ordinary bill, only a little in excess of the corresponding quarter, and at the end of the second quarter she received another bill, again in excess of the corresponding quarter in the previous year. She now complained at the gas-works, and thus it was six months before the authorities discovered there was no connexion between his parishioner's gas-pipes and the main. Now, from that instance they might gather many others. Since then he (the chairman) had had a most extraordinary quarter's bill. They had 15 or 16 burners, and ordinarily the gas for the year amounted to £7 or £8—never more than £3 per quarter—but this last quarter a bill had been sent in for £8, equal to 200 per cent. of an increase for the whole amount of an ordinary year's bill. Since then the school had been painted, and a great deal of extra gas had been used, and on an examination of the meter from Sunday to Sunday, he found they had only burned 3s. worth of gas, but when the account came in he knew he would be charged something like 9s. Counting the hours and weeks during which the gas was lighted, it ought not to have amounted to more than £1 19s., but instead of that he got a bill for £8. He did not intend to pay it; and as the summer was coming on, they might cut the gas off if they pleased. Some one might ask him why he did not intend to pay. Because he was certain the amount of gas represented had not been consumed. If a certain amount of air was put into the pipes, they had no right to be compelled to pay for that vitiated air. They contracted to pay for gas, and not for vitiated air. They had entered into a contract that the authorities should supply them with a good article, and that they (the public) should pay for it; but if they were supplied with a bad article, he did not think the public should adhere to their part of the contract. He did not know the truth of it, but he was told there was a particular way of forcing air into the pipes, and that the air went through the pipes and affected the meter precisely in the same way as gas would. Then they were paying for what was not gas at all. They had to pay for that which depreciated the gas and likewise increased their bills. He would ask them whether that was fair. When an account was disputed, the gas people were ready to tell them the remedy was in their own hands, and without showing who were in the wrong—for they were their own lawyers—they cut off the connected pipes from their houses and their shops, and, in doing that, they broke the contract they had entered into. If a gas consumer said he did not owe a certain bill, the onus should be with the authorities to show that he was entitled to pay it. Until that was done they had no right to cut off the gas. Supposing they allowed an account to go beyond the period mentioned in the Statute of Limitation—and that was precisely the case with regard to himself—and the persons said they did not owe the money, the gas people would, without any ado, cut off the gas from their premises until the account was paid. In his case he was the only person they could intimidate, therefore they cut off his gas, thinking it would make him pay his bill. It was a most unfair proceeding. Supposing the infirmary and the workhouse authorities, did not pay their gas bills, the gas people might intimidate Mr. Fairbank or Mr. Smallman in the same way into paying the bills, rather than sacrifice the health and comfort of their patients. That was an aspect of the question that affected him, and one which, at any time, might affect any of them. Some of the facts he had mentioned were admitted by the gas authorities themselves, They admitted that the collectors might have put down what they imagined the consumers had used. If that were the case, he did not think the public were called upon to pay their bills. To show how things were conducted in the gas office, he might state that the very bill he paid two or three weeks ago had again been sent in to him, although he had the receipt in his pocket. A gentleman told him he received a blank form in a stamped envelope. That was the way the gas people did their business. He presumed this was the first time there had been a meeting in Wigan on the subject. They had been connected with the old company for many years, and they had regularly paid their bills, because they believed they were due; but now things had undergone a very considerable change, and they felt the gas authorities were not giving them the article they contracted for, and that they were charging them an exorbitant price for what was supplied them.

Mr. S. TAYLOR said a bill amounting to about £5 had been received for gas for the Scarisbrick Baptist School, many of the lights of which had not been used during the last quarter. They had had lighted two burners in one class-room for an hour four nights a week, and another burner one hour one night in the week. As he had said, the bill for those lights was £5, but for the chapel, which had 45 lights burning every Sunday, the bill only amounted to £15 for the same quarter. There was surely some explanation required there.

Mr. BIRKETT said that last summer a bill was sent to the managers of St. Catharine's Schools for £19. As that was about the time Mr. Higham left the parish, the school for two months out of the quarter was rarely used, in consequence of there being very few meetings held. Altogether no more than eight or nine jets were in use during the whole quarter, and that only on one or two occasions. Ultimately it turned out that there was a leakage between the ceiling and the rafters. It seemed that preparatory to the congregational tea party a man had been sent from the gas-works to make things right for that occasion. He perceived gas was leaking between the ceiling and the rafters, and said he would come again and rectify it. He, however, never came, and the result was that the managers of St. Catharine's Schools settled the bill by paying one-half.

The CHAIRMAN said he had lately read the Gas Works Clauses Act, and no company had any right to cut off the gas without giving 24 hours notice of their intention to do so; but in his case he received no notice, and as he was the party to whom the bill was sent, he apprehended notice should have been sent to him before the gas was cut off.

Mr. BELLIS proposed that a committee of five gentlemen be appointed to consult some eminent practical gas engineer upon the question, and to take such other steps as might be necessary to promote the object of the meeting.

Mr. J. FAIRHURST seconded the motion, which was carried unanimously, and the committee was at once nominated.

Mr. GEE said the next question was, what should they do? Should they allow the discount to lapse, and not pay the bills until some action was taken by the Gas Committee? Whatever they did, they should resolve to act in a body, or their meeting would be useless.

The CHAIRMAN said that of course remained for the meeting to decide. It was a serious and important question that Mr. Gee had put.

Mr. M'CLURE suggested their paying the bills, but under protest.

The CHAIRMAN: That would give you freedom for any further action.

Mr. BELL: I am afraid, however, a protest would not be of much use.

The CHAIRMAN: It is the feeling of the meeting to combine not to pay the bills until some satisfactory solution is given.

Mr. TAYLOR: You must remember that unless the bills are paid the gas will be cut off.

Mr. WALKER: But the Gas Committee cannot afford to cut them all off. They will never put in mine again if they once cut it off.

The CHAIRMAN: As regards myself, I will not pay my school bill. I will stand by myself in that respect.

Mr. WALKER: I propose that we refuse to pay until they make some deduction.

Mr. FORT suggested that the committee appointed should wait upon the Gas Committee.

The CHAIRMAN said that as they were animated with one feeling, it was a question whether they could be beaten. The chance of success was in united action—if there was any difference of opinion they could not succeed. Their meeting that night was a representative as well as an influential one, and many large consumers were present. As he had previously said, the gas people had no right to cut off any one's gas without giving at least 24 hours notice, but in many instances, and among the poor, it was cut off without any notice whatever being given. Such practices, however, were totally illegal. Recently the gas authorities at Southampton and Blackburn had been proceeded against for cutting off the gas, and both of them lost the day; the Court ordered them to pay the damage, and, as compensation, 5s. for every day the gas had been cut off.

Mr. EDWARDSON said the committee would, with the least possible delay, obtain the opinion of some eminent gas engineer, and advise their friends what to do in the matter.

Mr. BELLIS suggested that they should get up an indignation meeting to be held in the public hall, and doubtless many small consumers would come forward and tell them how their bills had also been enormously increased. He did not think the dissatisfaction simply rested with the tradesmen. A gentleman in the room had told him that one cotton-spinner's quarter's bill was £100 in excess of the corresponding quarter in last year.

Mr. HURST said he had seen some working people that day who had told him their gas bills were double what they used to be.

Mr. J. FAIRHURST said he had been told by a cottager in Frog Lane that the increase among the working people in that neighbourhood was equal to 50 per cent., and that if a public meeting was held he would make it his duty to make a house-to-house visitation for the purpose of ascertaining the exact amounts.

Mr. WALKER said they should wait till they had consulted some gas engineer before they called a public meeting.

Mr. HOWE suggested that the thing should be deferred until they saw what explanation was given at the next quarterly meeting of the Town Council, which would be held on the first Wednesday in February.

Mr. GEE proposed that a public meeting be called, but that the arrangements be kept in the hands of the committee.

Mr. BIRKETT seconded the motion, which was carried unanimously.

A vote of thanks to the Rev. P. Hains for presiding terminated the proceedings.

PARA GAS COMPANY, LIMITED.

The Ordinary General Meeting of Shareholders was held at the Offices of the Company, Mildmay Chambers, 82, Bishopsgate Street, London, on Thursday, the 25th inst.—JAMES BRICKWELL, Esq., in the chair.

The SECRETARY (Mr. T. S. Borradaile) having read the notice of meeting, the following report and statement of accounts were submitted:—

The directors beg to submit the usual statement of accounts and balance-sheet for the half year ending Sept. 30, 1876, on examination of which it will be seen that the profits added to the balance brought forward from the accounts of the 31st of March last aggregate £6475 4s. 3d.; of this amount the interim dividend has absorbed £1668 14s., and, after making provision for bad debts, the amount now available for division amongst the proprietors is £4612 9s. 2d. This will admit of a declaration of dividend of 4½ per cent. per annum, carrying forward a fair balance; but the directors recommend to the shareholders that the dividend to be declared should not exceed the rate of 4 per cent. per annum (which, with that paid in March, will make 3 per cent. for the year), such dividend being payable at such date as may be decided upon by the shareholders at the ordinary general meeting, to be held on Thursday, the 25th inst.

The improvement shown in the present accounts is chiefly owing to lower prices paid for coal and freights, the reduction of the debenture interest, and the strictest care in the supervision of the expenditure.

The letters received from the engineer and manager (Mr. Louis Penny) continue to be satisfactory, and the works are maintained in efficient condition.

In accordance with the powers vested in them, and after careful consideration, your directors declared an interim dividend at the rate of 2 per cent. per annum on the paid-up capital in June last.

As it is found that the half-yearly meetings of the company are but very poorly attended, that certain expenses consequent upon them can be avoided, and that half-yearly accounts are not so satisfactory to shareholders as the former annual statements, the directors propose to recommend the discontinuance of the half-yearly meetings.

Two of your directors—namely, Captain J. Walrond Clarke, and Mr. George Whitfield retire by rotation, but are eligible for re-election, and offer themselves accordingly.

Mr. Philip Crellin, the auditor of the company, likewise retires from office, but being eligible also offers himself for re-election.

Dr. General Balance-Sheet, for the Half Year ending Sept. 30, 1876. Cr.

Authorized capital		£175,000	0	0	Works, including extensions, furniture, &c.	£142,754	10	2
Less not taken up		8,130	0	0	Gas-fitting capital on March 31, 1876	£11,039 8 9		
		£166,870	0	0	Extensions to date	93 16 8		
Debenture loan		5,000	0	0	Value of stock in Pará	4,066 11 8		
Fire insurance-fund		717	5	7		£15,199 17 1		
Bills payable		859	2	2	Less gas-fittings sold, &c.	170 2 10		
Sundry creditors in London		742	13	6			15,029	14 3
Ditto in Pará		483	15	8	Lighter capital		1,732	14 11
Gas-fitting rental reserve-fund to March 31, 1876	£299 7 5				Stores		1,933	15 5
Add reserve for the current half year, less expended in repairs	100 4 2				Coals		3,673	13 8
		399	11	7	Sundry debtors in Pará		11,057	0 4
Profit and loss account		4,612	9	2	Mauá and Co. (in suspense)		112	14 9
					Cash at Pará bankers		167	0 8
					Ditto Glyn and Co.		405	6 9
					Petty cash (London)		4	11 5
					Ditto (Pará)		0	8 1
					Bills of exchange, in hand		2,813	8 0
		£179,684	17	8			£179,684	17 8

Revenue Account.

Coals & wood for carbonizing		£3,578	6	11	Public lamps, &c.		£5,736	17 2
Wages, including lamplighting, purification, and carbonizing		2,070	10	2	Private lights		3,560	7 9
Salaries		720	5	8	Public establishments		258	5 9
Sundry charges		63	11	6	Illuminations		104	7 10
Retorts		277	2	7	Fitting-rental		152	11 5
Repairs		207	3	10	Meter-rental		204	8 5
Office expenses, stationery, printing, &c.		123	9	7	Lighter revenue		193	10 0
Law charges		17	4	5	Coke		1,242	8 3
Gas-fitting revenue and expenditure		400	15	4	Tar		111	9 0
Interest and discount		23	15	10	Exchange		27	6 4
Debenture interest		150	0	0	Rent and taxes		137	9 2
Directors fees		300	0	0	Transfer fees, &c.		3	5 0
Profit & loss account (profit)		3,800	0	3				
		£11,732	6	1			£11,732	6 1

Profit and Loss Account.

Interim dividend declared		£1,668	14	0	Balance brought forward from March 31, 1876		£2,675	4 0
Bad debts to this date	£126 15 0				Revenue account (profit)		3,800	0 3
Less recovered during the half year	45 8 8							
		81	6	4				
Moiety of amount due by Messrs. Mauá and Co., considered loss		112	14	9				
Balance carried forward		4,612	9	2				
		£6,475	4	3			£6,475	4 3

The CHAIRMAN: Gentlemen, before asking your sanction to the report, I should like to make a few remarks in reference to our operations. The directors consider that there should be no secrets between them and the proprietors; and this being our annual meeting, I shall be glad of the opportunity to inform you how it is we are in a somewhat better position than when we met you here a twelvemonth ago. I cannot do better than begin at the beginning, and that will take us to the works themselves. And here I will speak first of some of the advantages we had obtained. Take coals for instance. The coals and wood carbonized in the corresponding half of 1875 cost £4226; last half year they cost £3578, effecting a saving of £648. The cannel that we used in the previous year cost us something like 90s. per ton; common coal and wood were also very dear. In the year 1876 we effected a considerable saving in the price of both coal and cannel, the cost of wood remaining about the same. In 1875 the coal carbonized in the half year was about 1600 tons; last half year it amounted to about 1850 tons. The saving in the cost of coal last half year was nearly equal to one-half per cent. on our dividend. The next item in which we have effected a saving is that of salaries, amounting to £154; and I may here state that we find our new manager fully equal to the anticipations we had formed of him. The item of wages is very similar in amount to that shown in the previous year's accounts; if any change, there is a slight diminution. Coming now to the balance-sheet, I cannot do better than refer you, in the first place, to the amount we have had to pay annually for borrowed money. You will recollect that we borrowed £10,000 at 10 per cent. That amount has been paid off, and the sum of £5000, at 6 per cent., has been issued in its place. We have in this way effected a saving of £700 per year, a not inconsiderable amount, considering the position in which we are placed. There is due in Pará the sum of £11,057. This is a very large sum, and it is in excess of the former year, when it stood at £9579; and perhaps it may not be out of place to make a remark as to how the amount has so much increased, because in the fact of always having so much money overdue lies one of the difficulties we have had to encounter. I trust, however, that the course adopted by the board, and the rigid instructions they have given to their manager, will have the desired effect of reducing this item. At the time our accounts were made up the Government owed us something like £7000, in addition to the current account. We are not in any doubt as to the security of the amount; we believe it to be as good an asset as we possess, but there is a difficulty as to when we shall come into possession of it. I am happy to state, however, that since this report was put into your hands we have received £2000, so that the £7000 is now reduced to £5000. There is, however, the current account to be added to this, so that the amount still due to us by the Government is about £7000. We believe that the promises that have been so repeatedly made to us, more particularly those lately received, will be fulfilled better in the future than on former occasions. We therefore hope on, because we feel that, as to its ultimate payment, the money is secure. The next matter I have to refer to is one which was before you on a former occasion, and which, I regret to say, remains in the same position. It is the amount of loss sustained by the failure of Messrs. Mauá, the bankers. Our account with them was £225 9s. 6d., and, looking at the condition of their estate, we have felt ourselves under the necessity of writing off a moiety of that amount in our present balance-sheet, the remaining £112 odd we have reason to believe we shall receive. And this brings me to make a remark upon the revenue account; and with reference to our receipts, I am pleased to tell you that, though the progress is slow, we are gradually increasing the amount. It is to be regretted that, although some improvement has taken place at Pará, the trade of that city is still anything than what we could wish to see it. In the public lighting there is a small advance—the increase for the half year being £72 3s. 4d., which, I think, has chiefly arisen from the energetic conduct of our manager there—in other words, we have not suffered during the past year from the severe fines to which we were exposed in former times. This I consider is very satisfactory. The next point I touch upon is even more satisfactory, and that is the condition of our private lighting. We have had an increase in this department, amounting to £304 11s. 11d., and as twelve months ago we were looking rather to a decrease than an increase, I think this is a very pleasing feature in our accounts. The fact is, we do not hear so much now, as we did then, of the use of kerosene. In the "Public establishments" there is also a slight increase—between £40 and £50; and the receipts from "Illuminations" have certainly not retrograded. The next item is "Meter-rents," and when I tell you that we have received an extra £20 on this account, you will see at once that we have now more consumers or larger meters in use, the fact being that we have both. The last item is that of "Coke sales," and I am equally glad to tell you that coke, which, not only in this country, but almost everywhere, is a drug in the market, has been sold better in Pará than before, we having realized an extra £100 by its sale in the last half year. Our manager, in his last despatch, wrote in good spirits on this subject, and said his coke was going off pretty freely. He has been able to enter into two or three favourable contracts with the owners of steam-vessels for the supply of coke, and for which he gets good prices. They take a fair quantity, and this keeps down his stock, so that he is enabled to get a better market for the remainder than he would otherwise obtain. Taking all these little local matters into consideration, I think we may regard this part of our report as satisfactory. I will now refer to our position with regard to dividends. Six months ago, you will recollect, the board paid an interim dividend at the rate of 2 per cent. per annum. That absorbed £618 14s. Having provided for this, and also for bad debts, the sum we have in hand this day is £4612 9s. 2d., which is equal to a dividend at the rate of 4½ per cent. Such a dividend would absorb the sum of £4171 15s., leaving us with a balance of nearly £550. But we strongly recommend you not to divide the whole of the amount, but that you should be content with a dividend on this occasion at the rate of 4 per cent.—*i.e.*, 2 per cent. for the half year. This will absorb £3337 8s., leaving a respectable balance to be carried forward to the next account. There are one or two other matters in the report to which I might allude, more particularly that which refers to the holding of half-yearly meetings, and I am glad to see one or two gentlemen present who have expressed themselves strongly on this point in past times. The experience of the directors is that they cannot render such detailed accounts of the operations of the company at the semi-annual meeting as they could desire, and, therefore, they have inserted a clause in the report, embodying their recommendation that those meetings should be abandoned. At the same time, if it is the wish of the proprietors generally that they should be continued, the board will be only too happy to carry that wish into effect. I now move—"That the report and accounts of the directors, as presented to the meeting, be approved, adopted, and entered on the minutes."

Mr. WILSON seconded the motion, which was put and carried unanimously.

The CHAIRMAN moved—"That the interim dividend paid to the shareholders at the rate of 2 per cent. per annum, for the half year ending the 31st of March last, be and is hereby confirmed, and that a half-yearly dividend to the 30th of September last, at the rate of 4 per cent. per annum, free of income-tax, be declared, payable to the shareholders on and after the 1st of March next."

The motion was duly seconded and carried.

On the motion of the CHAIRMAN, seconded by Mr. H. P. STEPHENSON, the retiring directors—Captain J. W. Clarke and Mr. George Whitfield—were unanimously re-elected; and, on the motion of the CHAIRMAN, seconded by Mr. GEORGE, the auditor—Mr. Philip Crellin—was also re-elected.

The CHAIRMAN then moved, and Mr. TATHAM seconded, a motion to the effect that the half-yearly meetings lately held be discontinued for the future.

Mr. WHITE said he presumed, from what had been stated by the chairman, that the holding of half-yearly meetings was not provided for in the Articles of Association.

The CHAIRMAN said it was not, and apart from the question of the increased work which the holding of the meetings occasioned, the directors felt it was more satisfactory to present to the shareholders the results of their operations for a whole instead of a half year when they met them.

Mr. STEPHENSON asked what the proposition of the board involved. It might be, and probably was, desirable to omit the meetings in the summer months, when many shareholders were away from town, and there was a difficulty in obtaining a quorum, but if the passing of the resolution carried with it the omission to make up stocks and circulate the accounts half-yearly, and the non-payment of the interim dividend, he thought it would be detrimental to the interests of the shareholders.

The SECRETARY, being appealed to, said that before the arrangement was made for holding half-yearly meetings, the accounts were received from Pará half yearly, and the books in the London office were made up half yearly; and a statement of the affairs of the company submitted to the directors, so as to enable them, as required by the Articles of Association, to declare an interim dividend; but the accounts were never circulated amongst the shareholders until the close of the financial year, when the annual report was presented, and the interim dividend approved.

Mr. WILSON urged upon the board the importance of having the stocks taken, and the accounts made up half yearly. In the present prosperous condition of affairs his remarks could not be considered inimical to the

directors. With regard to the half-yearly meetings, which he had always advocated, he was prepared to abandon his position, if the shareholders generally thought the meetings undesirable; but he reminded them that a retrograde condition of affairs might arise, in which it would be desirable that the board and the shareholders should have such an opportunity of consulting together as was thus afforded. As to the accounts, he admitted that, as far as they went, they were perfectly clear; but he conceived that they did not go far enough. In his opinion every gas company should present their accounts in a form similar to that adopted by the metropolitan companies, which showed exactly the quantity of coals received, carbonized, and in stock, the quantity of gas produced, and the returns for secondary products. The shareholders were thus placed in a condition to judge accurately of the position of the undertaking. He was pleased to see, from the report just presented, that the private lighting at Pará was extending. The basis of the company's success was the development of the private consumption of gas. No doubt the advance in the cost of kerosene had limited the competition of that means of artificial lighting with gas, and he would like to know whether any experiments had been made in Pará to show the value of kerosene in comparison with gas. He observed that coke had advanced a little in price, but did not think it was as yet what it should be, because nothing but cheap coal could compete with it in Perá. Mr. Penny seemed to be taking the right course in making contracts for the disposal of his coke, so as to keep down the stock. With reference to the purification of gas, he remarked that it involved a very considerable expenditure. He would like to ask the directors whether they had made any inquiries respecting Mr. Livesey's ammonia process of purification. At Pará the ammoniacal liquor was useless in a commercial point of view, because it did not pay to import sulphuric acid. It might, therefore, be well worth inquiry whether the process to which he had alluded could be adopted.

The CHAIRMAN said, with reference to the half-yearly meetings, the board had no very strong views, and would not attempt to force the recommendation he had read, upon the meeting, against the general wish of the shareholders. He was glad to hear the judicious remarks made by Mr. Wilson, and so far as the board could adopt his suggestions, they would be glad to do so. But it must not be forgotten, that greater difficulties existed in reference to an undertaking carried on in Pará than in one much nearer to London.

After some further conversation the resolution for abolishing the half-yearly meetings was put and carried, it being understood that the half-yearly stock taking and making up of accounts (copies to be furnished to the shareholders), with the payment of interim dividends, should be continued as heretofore.

On the motion of Mr. GEORGE, a cordial vote of thanks was given to the chairman and directors for their services.

The CHAIRMAN acknowledged the vote for himself and colleagues.

On the motion of Mr. WILSON, the thanks of the meeting were given to the secretary and the other officers of the company.

The SECRETARY acknowledged the vote.

The CHAIRMAN said he omitted to refer to one remark made by Mr. Wilson—viz., the purification of the gas by an improved process. He was aware that experiments had been made, by the talented engineer of the South Metropolitan Company, of purifying gas by the use of ammonia; but he had not heard that any practical results had yet been obtained upon a scale sufficiently large to justify the general adoption of the plan. At the Beckton and Bow works, of which he (the chairman) was a director, it had been, or was about to be, tried; and he could only assure the honourable proprietor that the directors were fully alive to the importance of that or any other process that promised to be effective and economical.

The proceedings then terminated.

SALFORD CORPORATION GAS-WORKS.

A Special Meeting of the Salford Corporation was held on Wednesday last—the MAYOR (Alderman Walmsley) presiding—to consider the report of the Gas Committee (published in the JOURNAL of the 9th inst., p. 54) on the proposed alterations and extensions of the gas-works.

Mr. SHARP, chairman of the committee, proposed the adoption of the report. He said that it contemplated the carrying out of one complete scheme, at a cost of £160,000—£30,000 of which would be applied in making good deficiencies, and £130,000 in carrying out extensions. To divide the scheme into separate parts, and to carry them out separately, would be the most extravagant course that could be adopted; for, in that case, £30,000 would be spent in providing apparatus which would, perhaps, be useless when the larger scheme was completed. The money which it was proposed to expend in supplying deficiencies would not enable the committee to manufacture more gas. The whole scheme had been considered with the view to its being executed in the most economical manner, and the land had also been laid out with that view. The money spent would, he believed, realize a good per centage.

Alderman JENKINS seconded the motion.

In answer to Alderman Brown, Mr. SHARP said he hoped that at the next council meeting, or the next but one, he should be in a position to move a resolution lowering the price of gas.

Mr. MIDDLEHURST supported the motion.

Alderman LEE said he thought it would have been well if the Gas Committee had taken the council into their confidence years ago. They would not then have been placed in the dilemma they were now in, for he believed they were insolvent, and that it would be many years before the districts received anything towards their improvement accounts from the profits arising from these works. He believed the committee had lost a large sum of money on coal contracts; he hoped to have been able to say how much that loss had been, but he had not got the information; and he believed—though he had not much foundation for what he said—that their plant had been reduced so much in value as partly to account for the position in which they now found themselves. He was of opinion that for the present they should only proceed with so much of the work as was necessary to increase their purifying and cleansing power, and thus make the gas something like what it ought to be. It seemed to him there was great need for that, and also for a reduction in the price at present charged to consumers. The price of gas in the outside districts was 4s. 8d. per 1000 cubic feet. He considered that the gas ought to be made and sold at 3s. 6d. per 1000 cubic feet, and that a margin of profit should be secured at that price, because coal was cheaper now than it had been for 20 years past, and if gas could be made at a profit five or six years ago, when the price charged was only 3s. 6d. per 1000 cubic feet, he saw no reason why they could not do the same thing now. He did not wish to be obstructive to the committee; but, as a member of the council, and having public duties to perform, he was bound to express his opinions relative to anything that he thought was under unsatisfactory management.

Mr. SINCLAIR protested against the last remark.

Mr. Alderman LEE said it was not his object to injure the reputation of the committee. They now numbered among their members some of the best men in the council, therefore he had some hope; but he must say that in times past there had been considerable neglect.

In answer to a question, the TOWN CLERK stated that if the council passed the resolution they would commit themselves to only the principle of the report. All the contracts must of necessity come before the council for confirmation.

Mr. SINCLAIR defended the action of the present committee, who were appointed about a year and a half ago, and urged that they should not be blamed for the errors of their predecessors.

After some further discussion, the council divided, six members voting against and twenty-seven in favour of the resolution, which was therefore carried.

EXPLOSION AT THE DEWSBURY CORPORATION GAS-WORKS.

On Friday morning last (says the *Dewsbury Reporter*) an explosion of an exceedingly disastrous character took place at the old gas-works, Bradford Road, Dewsbury, which works were purchased not long ago by the Corporation from the Dewsbury and Batley Gas Company. It was intended, as the large new works in Savile Town were finished, that those in Bradford Road should be discontinued, and it is fortunate that the producing power at the new works is so great as to almost render the town independent, even now, of the old ones, for the late catastrophe has undoubtedly materially interfered with the production of gas at that establishment. The works, which are situated at the junction of Mill Road and Bradford Road, consist of two medium-sized telescopic gasholders or gasometers, a retort-house of considerable size, besides the usual apparatus for purifying and registering the gas.

The noise of the explosion was heard all over the town, and over a very considerable portion of it the shock of the explosion, like that of an earthquake, was distinctly felt. Great numbers of people at once made for the scene, amongst them our reporter, who was one of the earliest. He found on nearing the place that outside there were little effects of the explosion to be seen, with the exception that numerous windows of adjacent houses, and other buildings, were broken, evidently by the concussion of the air. In one house the lower part of the window sash had been entirely blown in. On entering the yard an awful scene presented itself. From the top of one of the gasholders, the one at the south end of the yard, a large flame of gas was issuing, and smaller jets of flame were issuing from along the rivet holes. The cause of this evidently was that the concussion had so shaken the fabric as to render it leaky at the joints, and the gas had become ignited. The yard of the works was strewn with fragments of slate and rafters from the engine-house, purifying-shed, and the building where the materials used for purification are stored. Some damage had been done to the retort-house by several stone flags of the roofs having been carried away, but it was not damaged to any serious extent.

The effects of the disaster were more plainly perceived on nearing the engine-house. Here we must pause to mention that it had been found necessary to muster the *employés*, 23 in number, and call the roll, to ascertain if all were safe. This was done by one of the foremen, when it was found that John Smith, a yard labourer, residing in Springfield Gardens, was missing. It was, therefore, decided to search for him, as it was believed possible that he might be under the ruins of the engine-house, which building had, with the exception of one wall, been entirely blown down. An immediate search was made, and the poor man was discovered quite dead shortly after eight o'clock. His head was smashed, and his feet were very much bruised. Death appeared to have been instantaneous. Smith leaves a widow, but we understand he has no children. An extemporized stretcher was got, and the remains of the unfortunate man were conveyed to one of the outbuildings, and subsequently removed to his late residence. This brings us to the immediate scene of the explosion—the purifiers. These purifiers consist in the main of large iron boxes of enormous size and weight, and they were seriously displaced; and it was here that the full effect of the explosion had shown itself. The shed adjoining, containing the materials used for the purification of the gas, was considerably damaged, the roof being almost blown off; the slates were nearly all displaced, and the rafters were broken, many of them into pieces a yard or so in length. The iron casing of the scrubber was cracked, and it was noticed that the tar inside had become ignited. Besides all this damage, the explosion had forced down the wall separating the old yard from the one where the lime, iron pipes, &c., are stored. The roofs of several houses near were damaged, and the inmates were greatly alarmed. How the explosion was caused could not at the time of writing be ascertained, and probably may never be known with certainty; but some light is sure to be thrown on the affair at the inquest upon the body of Smith.

COALS AND COAL GAS IN AMERICA.

The New York correspondent of the *Standard*, writing on the 22nd ult., makes the following remarks:—

In September our domestic economists were greatly rejoiced at the breaking up of the monopoly in coal which resulted from a quarrel in the Board of Control, a ring which had managed and manipulated the trade for the mining and railroad companies for several years, gradually putting up the prices until they were extortionate. It was then predicted that the combination would soon rearrange the matter and go on with the monopoly. That prediction has not yet been verified; but two other monopolies have made decided advances since then, both in the direction of our carbon necessities—petroleum and gas.

Before giving the new monopolies, a glance at the coal question may be in place. The sale of 97,250 tons of Pittston coals at the regular monthly auction indicates a slight advance on the November rates, but not an alarming one. The November sales, by averages, were:—

Grate coal	2·64 dols.
Lump	2·67 ,,
Steamer	2·66 ,,
Egg	2·60 ,,
Stove	3·34 ,,
Chestnut	3·59 ,,

The sales the day before yesterday gave the following figures:—

Grate	2·82 dols.
Steamer	2·82 ,,
Egg	2·82 ,,
Stove	3·44 ,,
Chestnut	3·59 ,,

A concert of action between the producers of crude oil and the refiners was begun some months ago, and its effects are now coming to light. Behind this movement as a motive lies the fact that many citizens, especially in large cities, finding gas too expensive, were beginning again to use kerosene lights; and new patents of kerosene heating-stoves were popularizing the use of kerosene as a heating material. The understanding seems to have been between the gas makers and the petroleum miners, and partly against the refiners and wholly against the consumers, whether of gas or oil. But in the progress of the issue the refiners join the miners. The coal miners had had their ring broken, and hence stood aloof; contracts for foreign trade having been made months in advance, that trade was not immediately affected, and indeed has not yet been sensibly so. But the effects came at once to the consumers of the refined oils, especially kerosene for lamp use. The hundred vessels at this port now loading with petroleum and its products, amounting to some 400,000 barrels, were

supplied by contracts ante-dating the effective operation of this "corner," but the retail prices in this city for four weeks have shown the character of the operation mentioned. Retailers used to buy their stock at from 17 to 20 cents, and they sold it at an average of about 20. Then they had to pay—the scale rapidly sliding up during a few weeks, when kerosene stoves and winter weather both prevailed—higher prices—25, 27, 30, 34, 38, and the consumer paid prices correspondingly high, as high as 50 cents a gallon being paid not a week ago. Then it was plain that consumers would cut down their quantity, and prices relaxed a little. Yesterday we were told that the "corner" had been broken up; and to-day we are offered kerosene at 34, which may have cost the retailer more money than he asks; and we are told to hope for yet material reductions in price.

Co-operating with these operators—participators in their crime—we have the gas companies of this city, with no doubt ready followers in all the great cities, but whose plans have not transpired yet. The gas question has a twofold aspect—private or individual, and public or municipal.

The cost of manufacturing gas in this city has been something like a dollar and a half per 1000 cubic feet; but to-day, owing to a cheapening process, known as the naphtha enriching process, and to the decline in the price of coal, the cost of making 1000 feet of gas is not more than one dollar. What the profits of the gas companies—there are five of them in this city—have been (even before the recent late cheapening) may be inferred from the quotations of gas stocks. These quotations for three of the companies are for 100 shares:—

Mutual	100 dols.
Metropolitan	146 „
Manhattan	245 „

The others are not at hand. The Mutual is a new company, established in 1874. One of the companies has been paying dividends exceeding 20 per cent. for several years. The usual price of gas here is 2·50 dols. per 1000 feet. In Chicago it is 1·50; and it is between these figures in Brooklyn Baltimore, Detroit, and St. Louis. But we are looking at New York prices just now. The crisis in gas was reached not many days ago by the rejection of the bids made by the gas companies for lighting the city for the year 1877. This rejection was the result of a discovery of the fact that there was concert among some of the companies, if not all. The corporation attorney's report on the bids, in which he advises their rejection, says—"The bids would seem to furnish conclusive evidence of collusion among the various companies by which the city is mapped out and divided up among them, and the city thus deprived of competition." There are five companies, and 19,573 lamps. The bids and numbers of lamps included in each are as follows, the price in dollars being that bid for each lamp the year, the companies to light and to put out the lamps daily:—

	Dollars.	Lamps.
New York	36·00	4142
Manhattan	36·00	4116
Metropolitan	32·00	3719
Harlem	37·50	4061
New York Mutual	36·00	3535

To contrast these bids with the prices paid in former years, the following table giving four years will suffice:—

	1873.	1874.	1875.	1876.	1877.
New York	39	33	28·00	23·00	36·00
Manhattan	39	33	28·00	23·00	36·00
Metropolitan	39	33	28·00	34·12½	32·00
Harlem	39	39	38·95	37·95	37·50
New York Mutual	—	35	29·16⅔	25·75	36·00

In view of the cheapening mentioned, the bids for next year appeared to the municipal authorities to be extortionate, and were consequently rejected, and other offers advertised for. The combination claimed to be discovered was among the three companies that bid 36 dols. for each lamp a year. The two other companies bid less than last year's price, and the local reasons for difference of bids are well known. The appropriation made by the city for next year's light is 700,000 dols.; but the bids of the five companies aggregate the sum of 831,000 dols. In competition with the local gas companies, a company in Boston—the Globe Gaslight Company—offer to affix their patent gasoline attachments to all the street lamps in this city, at a cost of 26·48 dols. a year, attending to all the details as the gas companies usually do. This bid falls within the appropriation, being 518,293 dols., which is some 312,700 dols. less than the aggregate bids of the gas companies. As if preparatory towards entertaining some such plan rather than submit to the imposition of the gas company combination, the city authorities passed a resolution that the Mayor, Comptroller, and Commissioner of Public Works be respectfully requested to consider the propriety of inaugurating a system for the production and supply of gas for public and private purposes, similar to that now in use for furnishing water; that, in order to provide for temporarily lighting the streets, the officers above named be requested to substitute oil or other illuminating material in the lamps of Fifth Avenue, as an experiment, and that the result of the experiment be duly reported as soon as the public interest seems to call for it. This resolution, and the call for bids—to be opened on the 28th inst.—for lighting the city for three months instead of a year, indicate that the City Fathers mean to resist the gas monopoly to the bitter end. It is expected that the gas companies will break down in some graceful way, for nobody believes their pitiful stories of losing money, and nobody is likely to believe them so long as they pay such handsome dividends.

As a matter of history, interesting in connexion with the present gas war, the price of furnishing light to the city paid the five companies by the city since 1858 may be given. The basis and figures are the same as in the tables given above in part:—

Year.	New York.	Manhattan.	Harlem.	Metropolitan.	New York Mutual.
1858	25·78⅛	25·00	28·80	—	—
1859	25·78⅛	25·00	28·80	—	—
1860	25·78⅛	25·00	28·80	—	—
1861	25·72½	25·00	28·80	—	—
1862	25·78⅛	25·00	28·80	—	—
1863	25·78⅛	25·00	28·80	—	—
1864	25·78⅛	53·00	28·80	—	—
1865	45·00⅛	53·00	50·00	50·00	—
1866	45·00	53·00	50·00	50·00	—
1867	45·00	53·00	50·00	50·00	—
1868	45·00	53·00	50·00	50·00	—
1869	45·00	53·00	50·00	50·00	—
1870	45·00	53·00	53·00	53·00	—
1871	45·00	53·00	53·00	53·00	—
1872	41·04⅛	41·04⅛	41·04⅛	50·00	—
1873	39·00	39·00	39·00	—	—
1874	33·00	33·00	33·00	39·00	35·00
1875	28·00	28·00	38·95	20·00	29·16⅔
1876	23·00	23·00	37·50	34·12½	25·75

UTILIZATION OF TOWNS WATER.

On Friday, the 12th of January, Mr. A. M. Fowler, borough engineer of Salford, read a paper at the meeting of the Scientific and Mechanical Society, Mosley Street, on "The Utilization of Towns Water." After some preliminary remarks on the importance of obtaining an abundant supply of good water, he said: The distance to be traversed to obtain a supply of pure, bright spring water (containing, say, from 4½ to 5 degrees of hardness) does not now-a-days seem to be so serious a question as in the past; but when we consider how small a portion of this pure water is actually used for cooking, drinking, and washing, it is desirable to ascertain how such water can be best appropriated for our domestic use, instead of appropriating it for manufacturing and other purposes, when water of an inferior quality would do. Chemical analysis has of recent years been so fully brought to bear for the detection of pollutions in drinking and river waters that we are able, by this means, to speak with some degree of certainty as to the fitness of waters for domestic use, and for the many other purposes for which the various qualities of water may be appropriated.

Knowing the great and increasing demands for water in our manufacturing towns, and the increasing difficulties year by year of obtaining an efficient supply, I deem it desirable that active measures should be taken to meet the increased demands. The manufacturer has never been in so precarious a position as at present. Royal Commissions have been appointed from time to time, and voluminous evidence has been recorded by them with a view, no doubt, of ascertaining the best means for preventing the pollution of our rivers and streams; but nothing has been done to show us practically how to preserve our watercourses in their original state of purity; for, whilst irrigation is recommended as a means to purify foul waters, Government has declined to sanction the acquirement of the large tracts of land necessary for that purpose.

I wish to show how bright spring waters can best be preserved, and, after being used, be utilized with advantage and profit. I propose to have a second source of water supply in all large towns having a population of, say, above 20,000 inhabitants, to be appropriated for all sanitary purposes—*i.e.*, the removal of all excreta and sewage by water carriage, the watering and cleansing of streets, flushing of sewers, for extinguishing of fires, the generation of steam, calico printers, dyers, fellmongers, and all classes of manufacture and trade, and for every other purpose except cooking, drinking, and washing.

The actual consumption for domestic purposes by the inhabitants of cottage houses amounts to about three gallons per head per day, and it may be said that the supply to the inhabitants of other dwellings amounts to five gallons per head. The supply to our large towns averages about 20 gallons per head—the smallest quantity being 15 gallons per head consumed at Norwich, 25 gallons are used at Manchester, whilst the supply to Glasgow reaches 50 gallons per head. It will therefore be seen that the actual quantity consumed for domestic purposes forms a small proportion of the large quantities of water brought into our manufacturing towns.

For the supply of water to closets attached to cottage property where the closets are outside the houses, I propose to utilize the waste water from the houses for the removal of the excreta refuse, by constructing the privy or closet at such a level outside the house that the whole of the slop and waste waters, and the rain from the part of the roof, may be discharged into and passed through a syphon-trapped pan of the closet. By this means the whole of the bright water at present used, as also the complicated machinery for the prevention of waste, will be dispensed with.

This suggestion I have fully realized in practice, and the system can be seen in the town of Longton and in West Market Street, Salford, where closets have been fitted up on this plan, and been in use upwards of two years. It has been said that they would freeze up in winter, and in summer there would not be sufficient water to cleanse them. Time has proved quite the reverse. The waste water passing through the closets is nearly ten times more than the curtailed supply admitted into the mechanical closets as required by some water authorities. I have had water-meters attached to this block of cottages, and also to a block of similar dwellings on the midden system, for a period of 140 days, and the test proves that the water supplied in each case is three gallons per head per 24 hours, thus showing that no extra town's water is used in these outside water-closets.

All local authorities ere long will be compelled by the recent Government measures to construct main arterial sewers through their respective districts, and erect works to deal with the sewage in such a manner that the sewage water may be discharged from the inhabitants so as not to be offensive. In the case of Salford, the corporation have already constructed a main trunk sewer through two-thirds of the borough to collect the liquid filth of the town, and have commenced to form works for treating the sewage so that the same may be passed into the river so as not to create a nuisance. On the carrying out of these measures the river Irwell will be entirely free from pollutions from that borough.

About 20 years ago the net cost of obtaining a supply of water was from 2½d. to 3d. per 1000 gallons; but in consequence of the increase in population in our large towns, the demands of the manufacturers, and the high price of wages and materials, the cost of obtaining water must now be taken at double this rate. The cost of conduits alone is now something enormous, when we take into account the great distance water is conveyed for our use. The manufacturers in Manchester fetch their water (so to speak) 14 miles. The principal supply of water for Liverpool is obtained from Rivington, 25 miles distant, for the town of Leeds 20 miles, and Glasgow 40 miles. The works necessary to secure a quantity for all purposes and at all seasons must necessarily be of such a capacity as to admit of storing, say, in the month of March, a six months supply; hence the great cost of works.

These enormous expenses entailed in securing bright waters should not fall upon the manufacturer if it can be shown clearly that a more economical method can be adopted by which this commodity (for the purposes I refer to) can be obtained at less expense.

The supply to millowners is generally measured by meter, and no doubt this plan would be universally adopted but for the likelihood of such a condition curtailing the supply of water for sanitary and domestic use, especially to the poorer classes. The meter system is, however, advocated by many, but it appears to me that such a method of taxing a water supply is similar to the old law of taxing the number of windows to our dwellings. For we all know that light, air, and water are most essential for our health and comfort, and we cannot have too great an abundance of them.

There are about three millions of people in the valley of the Mersey; two millions are supplied with water at a cost of about £4 per head, and they are taxed at the rate of 1s. in the pound on the rental. These enormous expenses would in a great measure be reduced to the manufacturer, and the constant construction of works would be obviated by utilizing the water in our midst. By the principle I propose the cost to the millowners would be at a permanent price of 2½d. or 3d. per 1000 gallons for any quantity required, instead of, as at present, 6d. per 1000 gallons, and in a few years likely to be much higher. In addition to this the supply would be constant and abundant.

GAS-METERS.

By W. J. WARNER, Chief Engineer of the South Shields Gas-Works.

[A Paper read before the Association of Foremen Engineers and Mechanical Draughtsmen of Newcastle.]

The paper which your committee has done me the honour to solicit is a very simple one, and most complimentary to my co-patentee, Mr. Cowan, of Edinburgh, and myself. It is, "A Paper illustrating the Working of our Patent Gas-Meter." Though your committee were thus very considerate in limiting the scope of the paper, yet I am almost tempted to think that they had an impression they were but inserting the key that would bind me to a general treatment of the whole subject. If so, I do not think they are to blame. The subject is one that comes home to you all; it touches the pocket of every housekeeper. It is interesting, too, though but little is known about it, and that of such a vague and general character that but few persons, comparatively, can read the index from which their bills are made out.

To meet, then, what I venture to say is the wish of your committee, I will deal with the whole subject of the measurement of coal gas, and in as simple a manner as I possibly can—arranging the matter under five heads:—

1. Standard measure.
2. Wet and dry meters.
3. The essentials of a meter.
4. The application of these essentials in the consideration of the two descriptions of Meters.
5. The results of testing large numbers of meters.

First, then, standard measure. The unit of this is one cubic foot. Now, as the weight of a cubic foot of water, at a temperature of 62° and the barometer at 30, is known to be 62·321 pounds, this weight of water drawn from a seven-gallon cask, or other vessel holding about 25 quarts, will leave a cubic foot of air in the vessel. If the vessel were connected to the outlet of a gas-meter, and the air drawn through the meter from the open inlet, the meter could be tested by such an arrangement; or if the vessel were connected to the inlet of the meter, a cubic foot would be forced through by the displacement of the air on the refilling of the vessel with water. In the first case the water would be displaced by the air, and in the latter the air by the water. Thus, irrespective of shape or configuration, we get a standard measure from any air-tight vessel; and though of the capacity of 1000 ounces which a cubic foot may be said to be, it will be found to be accurate to a drop of water, or a thousandth part of one of these 1000 ounces. With such precision is no other article sold, though one thousand thousands of these ounces are sold for 3s.

In the manner I have described the "testing gasholders" as they are called, for proving meters, are graduated. This instrument is simply a cylinder rising and falling in a tank of water; the upper end closed and air-tight, the other open to allow of the holder passing freely through the water, above which the pipe of communication with the interior of the holder is carried. To maintain a uniform pressure through the whole range of its action, a cycloid is attached to the shaft of the sheave over which the holder is counterbalanced; thus the holder may be subjected to any pressure below, at, or above the atmosphere, and such pressure will be uniform through the whole range of its action. The pressure prescribed by the Sales of Gas Act for testing meters is to be equal to that of a column of water 5-10ths of an inch high. By attaching self-indicating mechanism to the holder, it could be used as a meter, and would be one of the most simple in construction and action. The size, however, would prevent its use in a single form—the 10-feet one before you would only give about three hours supply to one ordinary burner; therefore the holder would have to be duplicated so as to have another ready for supply on the exhaustion of the first, and mechanism would have to be attached for opening and closing the cocks by the action of the holders, just as in the case of a steam-engine. Thus, you see a meter must necessarily be of a bulky form, of a complex character, and that the power to drive it is very slight.

Before going further, I may say that it is not necessary that the action of the holder should be vertical; its path of motion may be changed, as well as its form. A portion of an annulus may be used and moved from its centre. In this form a gasholder was constructed at The Gaslight Company's works in London early in the history of gas lighting, about 1813, and was called a "revolving gasholder." The shaft which carried the holder was made hollow, and passed through a stuffing-box; from this the pipes to and from the holder were carried. This was the germ of the gas-meter, to which I have now to draw your attention. Two holders were turned round a central shaft which conducted the gas to them, and to which were attached self-acting valves for opening and closing the communication between the supply-pipe and the chambers or measures, and between them and the burners. The first seven working diagrams are illustrative of this, showing the progressive steps in the development of the machine. The first being Clegg's "Revolving Gasholder." The second, two such chambers combined, forming an annular wheel, with a complex valvular arrangement; 3, 4, 5, 6, and 7 show various modifications in the form of the chambers of this wheel, by which the openings into and from them become hydraulic valves, thus dispensing with all mechanical action in valvular arrangement. The stuffing-box, too, was dispensed with by Mr. Malam, a cover was placed over one end of the wheel with an opening around the shaft, on one side of which was placed a bent pipe, through which the gas is conveyed into the hollow cover, thus materially reducing the friction of the machine.

The meter, however, still required further improvement in this respect, as the flow of gas was not sufficiently steady, Mr. Crosley effected this by changing the annulus into a wheel open at its axis, and placing the openings, or "hoods" as they are called, at the two ends of the cylinder; the inlet hoods under the hollow cover, and the outlet hoods open to the case, from which flows the measured gas.

The action of the meter was thus perfected, but the perfection of action was purchased at the cost of measurement. The measures or chambers in the annulus form were unvarying in capacity, but in the open wheel the surface of the water takes the place of the inner cylinder of the annulus, and thus every change of water-line affects the measurement; diagrams 8, 9, and 10 show this very clearly.

I must pass on, however, to the dry meter. Its prime mover—I cannot say its measuring chamber—will be best understood by substituting flexible sides for the metallic cylinder of the gasholder, and dispensing with the water. The duplication of the chambers, connecting-rods and valves, as I have explained in connexion with the gasholder, are all indispensable. Various kinds of these chambers, and various numbers of them, from 2 to 6, have been constructed and used in a more or less flexible form, but the principle is the same in all. The best form, and the one now generally employed, may be fairly represented by a pair of bellows; the valves used are the common slide, or D; but several kinds have been employed, as you will see by the diagrams, and by which you can also see their action.

The third head of my paper is "The Essentials of a Meter." They are—The absorption of a minimum of pressure; a continuous and steady flow of gas; accuracy of measurement under varying conditions; reliability and durability.

Fourthly, we have thus a measure of the comparative advantages of the two descriptions of meters in the application to them of these essentials. The first test applied to the two gives an equally satisfactory answer; in the absorption of pressure in action both are practically perfect; and it is marvellous to see these beautiful little instruments moving by simply blowing into them. In the second test we do not get the same satisfaction. The dry meter is equal to the wet in the delivery of a steady and continuous flow of gas when the instrument leaves the maker's hands, but it does not continue in the same satisfactory condition. The wet meter has but two working surfaces, the bearings of the shaft, on which the wheel revolves, and they are always under water. Not so with the dry meter. Here we find in the most simple instrument between 30 and 40 joints, without reference to the flexible leather forming the chambers, nearly all of which are exposed to the current of gas flowing from the mains, and what may be carried with it. Both leather and valves are affected; the friction, therefore, cannot be constant through each revolution, and thus the flow is interrupted and the lights made unsteady. Though this point is not second to measurement, yet it is with the measurement we are most concerned. The lights, like the pounds, will take care of themselves; it is the pennies of consumption to which we must give close attention.

The same cause here affects the measurement as the lights. The measuring chamber varies with the condition of the oiled leather, of which it is partly constructed. It stiffens, and the chamber is reduced in capacity; it becomes dry and porous, and so permits more or less gas to pass through the instrument without being measured. The valves also are liable to pass gas without being measured, by the deposit which takes place on them from the gas as it passes through the meter. They are also subject to another influence, which has passed almost unnoticed, but upon which I feel I can speak with great confidence to you—the lead and lap of the valve; now the position and condition of the valve must vary considerably in so frail and delicate an instrument.

We have here, then, structural weakness, and liability to error in principle, which cannot be remedied, nor can be found in the wet meter; but it, too, is liable to vary in its measurement, the capacity of the chambers varying with the water-line. There is, however, a great difference between the two instruments in this respect; so great, indeed, is it that (and here I would be understood to speak most advisedly) dry meters should be placed with another class of instruments than absolute measures, and considered as an "inferential meter," amongst which it may take the highest place. With such a variable chamber, and so delicate a valvular arrangement, how can there be absolute measurement?

This I submit to you, gentlemen, with your great and varied mechanical knowledge and experience, as well qualified to form a correct judgment, being free from professional prejudice on this subject. The soundness and the capacity of the so-called measures are dependent upon the condition of the leather; the soundness of the instrument, and the capacity of the measures, are also dependent upon the condition and action of the valves; the variation in the measurement cannot be otherwise, then, than unlimited—the instrument may work correctly for some years, but it may vary to the extent of 2, 3, 5, or 10 per cent. against the consumer, and it may also vary to any extent against the company.

Now place against this tin-box-full-of-complicated-gim-cracks the simple wheel of the wet meter, mechanically as simple literally as a grindstone, as rough in construction as a tin pot, and yet as delicate and as accurate as the finest balance—accurate, however, you must bear in mind, only as long as the water-line is maintained at its level—the least variation in this, as the surface of the water forms one side of the measure, and its accuracy is gone. As the water rises, the measure becomes less in capacity, the indication remaining the same as when the meter was correct, the registration is to the prejudice of the consumer; *vice versâ*, by the lowering of the water-line the company is prejudicially affected. Now I do not doubt a remedy for this will at once suggest itself to you, thus perfecting this beautiful instrument. It will take this form: Make an overflow chamber, and allow the surplus to run off; the consumer will then be protected against accident or negligence, and the company can look after itself by supervision and inspection.

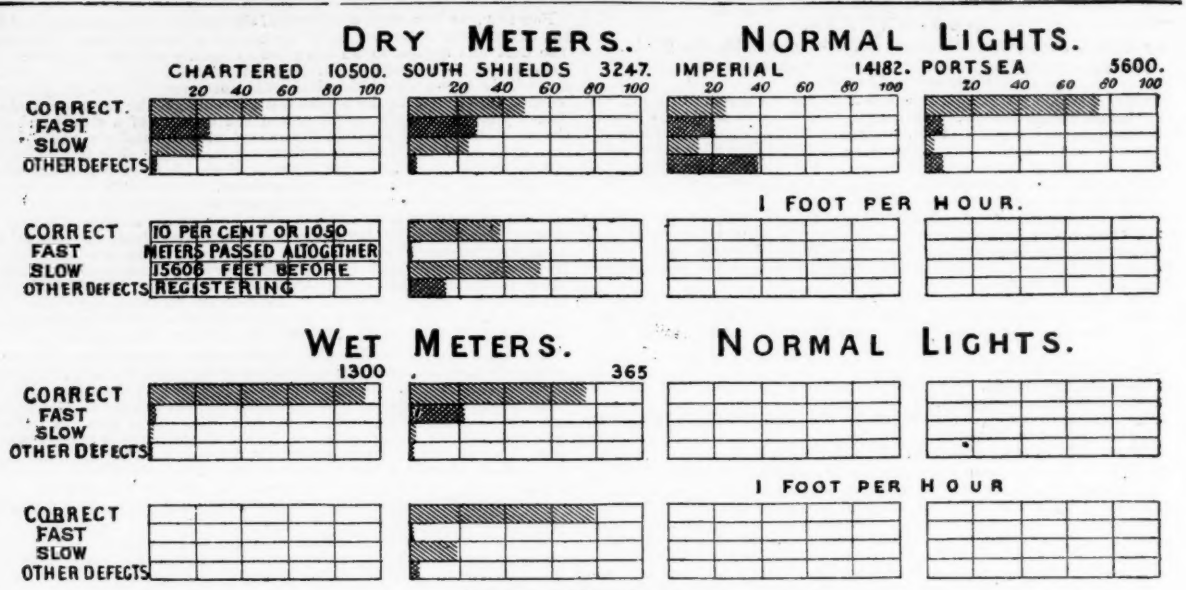
Now this was the state of things for a considerable length of time. The "spout" or pipe through which the gas enters the wheel was cut off at the water-line, the surplus water could thus flow down a pipe into a waste water-box, which, if not attended to, would fill and shut off the gas, thus effectually preventing the meter registering fast. To the inlet of the meter a valve was affixed, actuated by a float on the surface of the water, so that upon the water falling to a lower level, the valve closed and shut off the gas. Thus both buyer and seller were protected, the difference between the high and low level being the full extent of the variation in the registration of the meter to which it was liable.

By the Sales of Gas Act, passed about 15 years since, this is limited to 2 per cent. against the consumer, and 3 per cent. against the company—5 per cent.; and this was necessary for the action of the float in the wet meter. Although on this occasion there was a splendid opportunity for the dry meter advocates to bring their article to the front by agreeing to a lower range than 5 per cent., yet it was not taken advantage of, and so we may fairly infer that it was thought the dry meter could not be relied upon to maintain its accuracy, as all other measures are bound to do.

Many commendable attempts have been made to reduce this 5 per cent in the wet meter, and to obtain absolute accuracy. The proportions of the wheel were altered; it was made of less depth and greater diameter. The variable area of each chamber was thus reduced; but against this had to be placed the increased variable capacity of the hoods, which form a part of the chamber, being the passages of ingress and egress of the chamber.

Before proceeding, I would dwell upon the beautiful simplicity and adaptability of these hydraulic valves, which they really are. The simplicity is such that they have been spoken of as not being valves at all, but though only parts of the chambers, yet as they open and close the gas communications as they rise from and enter the water by the revolving of the wheel, the action must be valvular. Their adaptability consists in allowing the wheel to revolve in varying depths of water without their valvular action affecting the freedom or the measurement of the wheel. I know of nothing to equal this in the whole range of mechanics; and it comes simply from making the depths and areas of the hoods equal, and placing them on the opposite sides of the axis. Thus, at the highest water-level, the inlet hood closes sooner than when the water is lower, but as the chamber proper, or measure, is filled before this takes place, it is not affected by the closing of the hood sooner; nor is the wheel impeded, for as the outlet hood on the opposite side rises from the water, it adapts itself to the lessening capacity of the inlet hood, and so through all the changes of water-line.

To return to the attempts made to improve the meter, various arrangements were contrived to maintain the water-line at a uniform level. Supplementary vessels were employed for the purpose of feeding the meter by gravitation, floats and fountains, and by power, reciprocating scoops, and revolving buckets. All these marred, I need not tell you, the beautiful practical simplicity of the meter, and they were all, more or less, failures. Attempts have also been made to restore the annulus form of wheel.



RESULTS OF METER-TESTING.

These, too, have proved failures. The invention, however, of Mr. Cowan and myself restores the principle in action, but not in construction; indeed, I should say more than restores it, for the hoods would, as I have shown, cause a variation with the variation of the water-level; but, in our meter, not even this would affect the registration, and the meter remains in action as simple as the ordinary wet meter.

The principle of construction is not at all difficult to understand. A small wheel is made with its hoods and partitions arranged the opposite way to the ordinary wheel, but in every other respect like it. The small wheel is of such a diameter that its periphery is a little above the high-water line when the meter is in action, the small wheel being placed in the centre of the large wheel, and of about half its depth; thus one-half of the large wheel is an annulus, and therefore of unvarying chambers; the other half of the chamber is varying, being unoccupied by the smaller wheel; this small wheel, however, takes its supply from the measured gas in each chamber, and as the varying portion of each chamber is of the same capacity as each chamber of the small wheel, it follows as the small wheel takes its supply from the large one, that a varying volume of gas is removed by the small wheel from the larger, and thus a uniform volume of gas is measured and discharged at each revolution of the wheel. Besides the diagrams and models, a meter is in action showing the principle.

The other two essentials of a meter which I laid down are reliability and durability. Of the latter you can judge for yourselves, as both descriptions of meters are before you, but I will draw your attention to one fact—the metal of which the wheel is constructed is pure tin, and therefore incorrodible, while the dry meter is of tinned iron, and not so. I will advance no opinion upon the comparative reliability of the two descriptions of meters, but I place before you a measure of the same in the diagram on the wall. It is the tabulated results of testing between 30,000 and 40,000 meters by four gas companies: The Gaslight Company, London; the late Imperial Gas Company, London; the Portsea Gas Company; and the South Shields Gas Company. Each figure is divided into 100 parts in length; the four horizontal spaces are for the four classes, into one of which each meter has had to be placed—"Correct, fast, slow, and defective from other causes;" therefore each figure represents the true relative proportions, or per centages, of every 100 meters tested.

Though but a glance will show you the true state of things, we will look at the matter a little closer. The whole of the results, with the exception of those of the South Shields Company, are from a paper read to the British Association of Gas Managers at Leeds, June, 1875, upon the "Systematic Testing of Consumers Meters," and one of the conclusions arrived at is, "that while all meters should be periodically examined, it is imperative that with dry meters there should be a system of testing." "The Imperial Company make it their rule to test once in six years; but I," the author of the paper, Mr. Douglas, says, "soon satisfied myself that a more frequent inspection would be beneficial; I therefore fixed three years;" and he then adds that "as we have a separate tester who can manage about 3000 meters a year, and we have a little over 6000 meters in all, we manage to test every meter once in two years."

I must trouble you with these particulars that you may be in a position to estimate the value of the figures before you, His testing covers a period of 2½ years; 5600 dry meters were tested, representing 30,017 lights: the results are in per centages:—

	76·8	correct.
	10·0	fast.
	4·8	slow.
Stopped. . . .	2·1	otherwise defective, 8·4
Oscillating. . .	2·6	
Leaky	3·7	
	100·0	

His opinion of these figures I will give you in his own words. They are:—"A result which, from the gas manufacturer's point of view, is satisfactory—a result beyond which, so far as registration is concerned, I do not think we should be eager to go." To you—for it must be borne in mind that the consumer has to bear the expense, as well as the annoyance, of this taking down and testing every two, three, or five years—I do not think it will be quite so satisfactory to find that in less than three years 10 per cent. register against you, though nearly 5 per cent. register in favour of others, or that just upon 25 per cent. of the dry meters fixed cannot be relied upon for 2½ years. Passing on to the Imperial Company's results, you will find a marked difference between the two.

Against the correct . .	76·8	is found but	26·51 of the Imperial.
,, fast . . .	10·0	we have	21·52 Imperial.
The slow	4·8	is increased to	14·20 Imperial.
Otherwise defective . .	8·4	is increased to	37·77 Imperial.
	100·0		100·00

These figures, I need scarcely say, could not be used without some reference to the discrepancy between the two results, as both relate only to dry meters. Mr. Douglas says: "From this return it would seem that the proportion of defective meters was somewhat large; but the nature of the defects for which meters were condemned to be readjusted was trifling, showing the rigidity of the examination." This may have been satisfactory to him, but I scarcely think it will be so to you and consumers.

Now I will attempt to throw a little light upon this subject, though I am in possession of no other facts in reference to those two companies but what I have given you. We will gauge these facts by the diagrams of the Shields testing, taking first the "normal lights," or the testing of meters on the full number of lights for which they were made, as arranged under each company's name:—

	Chartered.	S. Shields.	Imperial.		Portsmouth.
Tested	10,500	3,247	14,182		5,600
Correct	48·77	49·43	26·51	48·03	76·8
Fast	25·50	24·54	21·52		10·0
Slow	22·60	21·81	14·20	51·97	4·8
Other defects . . .	3·13	4·22	37·77		8·4
	100·00	100·00	100·00		100·0

The Chartered and South Shields, we may say, are the same, 50 per cent. correct of the number tested. Making every allowance for the frequent testing at Portsmouth, and admitting that this has raised the per centage to 76·8, we have to deal with the Imperial only.

Now, no one knowing the nature of the dry meter would be satisfied with the normal test only, but would have each meter tested with a small light; that is to say, one about the size of those used in small passages or sick rooms, such as you see before you, marked one foot per hour. Please note the effect of this test upon the diagram, "South Shields;" the normal lights and the one foot per hour stand thus:—

	Normal Lights		One Foot per Hour.	
Correct	49·43	36·18		37·13
Fast	24·54	0·95		
Slow	21·81	51·61		62·87
Other defects	4·22	11·26		
	100·00	100·00		

We find here, then, a loss of 13·25 on the "correct;" add this to the Imperial correct, 26·51, and it brings up the figures to 39·76.

Now you will notice a considerable increase in the "slow" and "defective" on the one foot per hour. They are higher than the Imperial by 10·90; add this to the corrected Imperial figures, 36·76, and it brings the figures up to 50·66, against the Shields 49·43, and the Chartered 48·77. It may be said, "We can see why you take the difference between the normal and the one foot, but we cannot see why you take the difference between the slow and defective of the Imperial and Shields." It is because I believe the test was a more severe one than the Imperial, and, therefore, throw more meters down in the scale. This effect you will see on the whole of the one foot per hour when compared with the normal lights. Then compare the Imperial with the one foot per hour. In the former you will find 48·03 "fast and correct," but in the latter only 37·13. The Chartered tests on a small light have not been published in the tabulated form, but the same radical defect has been found; for it has been said that 10 per cent., or 1050 meters, allowed in the aggregate 15,606 feet to pass before beginning to register.

I am afraid I shall weary you with these figures, but they really ought to be widely known. Both company and consumer ought seriously to consider whether the use of such an instrument as a dry meter ought not to be prohibited. The evidence of Mr. Johnson, the superintendent of the Chartered Company, is alone sufficient for this purpose. He says, "Out of the 10,500 meters tested, there were 2728, or 25½ per cent., fast. The average per centage of each was 4·44. Then there were 2300, or 22·6 per cent., that were slow, the average per centage of error being 8·21." Bear well in mind that this is not the full extent of the evil. Hear what Mr. Douglas says: "Of the meters fast, only 105 were over 6 per cent. fast; and of those slow, only 101 were over 6 per cent. error," so that there were upwards of 200 consumers in Portsmouth, and about 5000 in one London district alone, between which there was a difference of 12 per cent.; and upon this Mr. Douglas complacently says that "what the company lost by meters not registering sufficiently was made up by nearly the same number registering in their favour." Admitting this, is it not a gross injustice to the consumers to allow such a state of things to continue? But there are worse, much worse cases than this. I have found dry meters registering 10 per cent. fast, and others, and not a few, 10, 20, and 30 per cent. slow and upwards. But what of the wet meters? The diagrams here tell their own tale again. They stand thus in figures:—

	Chartered.		South Shields.	
Tested	1300		365	
Correct	91·40	94·79	78·70	94·79
Fast	3·39		21·09	
Slow	2·71		2·74	
Other defects	2·50		2·47	
	100·00		100·00	
One foot per hour—				
Correct			76·82	
Fast			0·54	
Slow			16·98	
Other defects			5·66	
			100·00	

The Shields meters, I may say, are very old ones—between 20 and 30 years, I should think. But these, you will see, are infinitely better than the so-called improved dry gas-meter, not as many months old.

But I need not dwell further upon this. A gas-meter is now made that is unvarying and perfectly reliable, the construction of which is well known, and with which we have had 50 years experience—need I say I allude to the wet meter principle, with the improvements of Mr. Cowan and myself?"—improvements that leave the meter as simple and durable as of old, but of unvarying capacity under every condition of water-line. The report upon a dozen 5-light meters sent to a large town a short time since has just come to hand from the company. Seven are absolutely correct, and five vary only to the extent of half per cent. under all the changes of water-line, 7 gills of water being drawn off each meter.

There is now, therefore, no reason why gas should not be sold as other articles—by measure, absolutely correct, unvarying, and with a periodical testing of not two, three, five, or six, years, but ten years, and then ten might again be added to this, without the least fear of the interest of either company or consumer being prejudiced as long as the meter continued to work.

The meter has been called "an enigma," "a puzzle," "a conjuring box." I hope you will not henceforth consider it such, but look upon it as it has been beautifully described—as an instrument that may be "set in motion by an impulse less powerful than the breathing of a new-born infant, and discharging the duties assigned to it with the fidelity of a tried servant and the accuracy of a skilful accountant. The meter may truly be described as the offspring of genius well instructed by philosophy."

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The unsettled condition of Eastern political affairs has, in a great measure, tended to retard the further progress of that incipient improvement in the state of trade to which I have referred on several recent occasions. It was supposed that when the Conference terminated its labours, matters would be on a totally revised basis, and that merchants and other buyers would have some idea as to what they should do. This has not proved to be the case, however, and the consequence is that merchants who deal chiefly with the Levantine and Eastern markets are still holding back orders, lest the outbreak of hostilities should place them in a very disadvantageous position. This reticence, of course, largely affects the hardware industries, and in turn has a depressing influence on the iron trade. Notwithstanding this fact, however, the pig iron producers remain steadily firm in their quotations, and hold out for a slight advance for future deliveries. They are selling fairly good parcels of foundry brands of Derbyshire, Yorkshire, and Lincolnshire pig, but forge qualities do not move off very freely, owing to the quietude of the finished iron departments. At Staveley, Sheepbridge, Claycross, Stanton, Thorncliffe, Milton, and Elsecar, and a few smaller establishments, there is a steady output from the blast furnaces; the balance outside what is used on the premises being sent here or into the Staffordshire and Lancashire markets.

In pipe work there is still a fair amount of business in hand, on account of the Sheffield, Leeds, and other local undertakings, as well as for sundry London companies and provincial local boards. The brass manufacturers and makers of brasswork are well engaged, chiefly on engine brasses, water-works and gas fittings, together with general articles for the use of plumbers.

In the coal and coke trades there is a growing and most severe competition, with a consequent "cutting" of prices, which leaves a minimum of profit. Many of the district collieries remain wholly or partially flooded, and those which are in working order are only producing coal about three days weekly—a fact which indicates both lower prices and a reduction of the men's wages. Some of the local coalowners are sending consignments into Lancashire with somewhat encouraging success.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

There is no very material change to notice in the position of either the coal or iron trades of this district. In both branches of industry a general tone of depression continues to prevail, with a weakness in prices indicative of a fall in values before very long, unless a revival in trade, which does not at present seem probable, should give a firmer tone to the market.

Supplies of all classes of coal are abundant, and, what is a most unusual circumstance at this time of the year, stocks are accumulating at many of the pits. Colliery proprietors, who are determined to move off their production, have in many cases to do so at a sacrifice in price, and for sales in bulk considerably less than the list rates is being taken. There has not as yet been anything like the usual winter demand for the house fire classes of coal, and the consequence is that all the better descriptions of round coal are plentiful in the market. Good Arley coal can be bought at the pit mouth at from 10s. 6d. to 11s. per ton; Pemberton four-feet, 8s. 6d. to 9s.; and common coal at from 6s. 6d. to 7s. 6d. per ton, according to quality, the latter class of fuel being very difficult to sell; and for good shipping orders extraordinarily low prices are being accepted. Burgy and slack, except in the very best sorts, are still a drug in the market, the average selling price for ordinary burgy being 5s. 6d. per ton at the pit, and for ordinary slack it is difficult to obtain more than 2s. 9d. to 3s. 6d. per ton, whilst the common sorts are being sold for much less than this.

In the coke trade there is no improvement to report, and prices continue weak. There is still a good deal of underselling in the iron trade of this district, second-hand lots of north country iron being offered by needy holders at very low prices, and there is so much cheap iron at present being forced upon this market that the local makers, who as a rule maintain late rates, are securing little or no new business. For Lancashire pig iron, delivered into the Manchester district, the quotations remain at 56s. 6d. to 57s. 6d. per ton for No. 3 foundry, and 55s. to 56s. per ton for No. 4 forge, less the usual 2½ per cent.; but Middlesbrough iron, delivered, can be bought at 53s. 9d. to 54s. 3d. per ton for No. 3 foundry, and No. 4 forge at 52s. 3d. to 52s. 9d. per ton. The finished iron trade is quiet, but although there is a little pushing for orders, prices show no material change; Lancashire bars, delivered into the Manchester district, being still quoted at from £6 15s. to £7 per ton, according to quality.

A meeting of the Lancashire coal trade has been called for to-day (Tuesday) in Manchester, for the purpose of considering the advisability of forming a coal association for the protection of their interests, and a set of rules has been drawn up for approval.

THE COAL AND GENERAL TRADE OF THE NORTH.

(FROM OUR OWN CORRESPONDENT.)

During the last week the coal ports were entirely cleared of laden sailing ships, and steamers have been kept well employed in coasting business, as the weather has been favourable to their making quick passages. The supply of steam tonnage for coasting purposes is abundant, and little more than 4s. 6d. per ton is paid to steamers to load coals for the London market with other ports in proportion.

Business is dull amongst small coasting sailing ships. Freights consequently do not alter very much. There are very few orders in the market from south country buyers at present. Best gas coals are in average inquiry; but second-class collieries, in the Durham coal district especially are shortening the vend, as a rule, wherever it is practicable to do so. The inquiry for inferior gas coals is only moderate. The iron trade of the Tees, Tyne, and Wear, however, continues to present more favourable symptoms of revival. As the prosperity of a large number of second-class collieries in the Durham district entirely depends upon the local demand for coals, if the iron trade were getting stronger no doubt the tone of the second-class coal trade would likewise improve. In the meantime, until there is some such local revival, second-class coals will not alter very much in value.

Within the past fortnight there has been a more active inquiry for the better sorts of steam coals for shipment to the Mediterranean, at prices ranging from 11s. to 11s. 6d. per ton.

Freights to the Mediterranean have advanced considerably. The figure to the Italian ports has been fully £15 per keel, and to Constantinople above that; whereas freights to Odessa for handy steamers have nearly touched £20 per keel in some instances.

The goods trade to the Continent is no better. Very little business is being transacted for forward delivery. War rumours are stopping fresh business; and but for iron steamship building, of which there is a large amount of tonnage in hand, trade would be quiet in the North of England. Chemicals, however, though they do not advance in price, are firmer in tone, and the most satisfactory aspect of the market is this, that manufacturers refuse to enter upon business for the year at the figures now quoted for immediate delivery. At present the shipments of water and gas pipes, fire-bricks, or other material of that sort, to the Continent, are extremely limited. Until the war rumours are abated, continental merchants seem indisposed to enter upon business for the year.

There is an appearance of a tolerably active spring trade in timber. The recent prices are fully sustained, but house building in the North of England seems to have been over done, and there will be a considerable apparent falling off in the inquiry for wood in that direction this year.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

It is but natural that Sir Windham Anstruther should be greatly enamoured of his Burghs Gas Supply (Scotland) Act. Addressing a portion of his constituents last Thursday night upon recent and prospective legislation, the honourable baronet remarked, in regard to the Act, that it was of far more importance than at first sight appeared, inasmuch as it illustrated a kind of home rule which he would be glad to see our neighbours in another part of the country adopt—it did away with the necessity of applying to Parliament for private bills for lighting burghs in Scotland with gas, and put the whole power for so doing into the hands of the local authority, if they chose to avail themselves of its provisions. The Act, moreover, never lost sight of the social and political axiom, which laid it down that the public good was always best consulted by a due regard for private interests—an axiom which was applicable to other things besides gas.

It may be remembered that a fortnight ago I mentioned that the quality of the gas supplied by the Hawick Gas Company had been brought under the notice of the Town Council, and by the Provost under the consideration of the directors of the gas company. Since then Mr. Smith, the manager of the works, has written to the local newspapers, stating that not a single complaint had been made to the directors throughout the whole winter, and that the quality of the gas for the last four months had an illuminating power of 32 standard candles.

The gas supplied in Glasgow during the week ending the 20th of January showed an improvement upon that supplied in the previous week. In no case was the minimum illuminating power under 25·58 candles, the highest minimum being 26·80 candles at Dawsholm, while the maximum ranged from 27·66 candles to 28·28 candles at Tradeston.

At Alexandria, in the Vale of Leven, Dumbartonshire, a somewhat novel system of raising money for lighting the public street-lamps is being resorted to. The Street Lighting Association are getting up a concert, at which a popular West of Scotland vocalist is to give an entertainment, entitled "Twa Hours wi' Scotchmen." The cost of gas for the winter, working expenses, &c., is estimated at upwards of £50.

The last report to hand regarding the illuminating power of the Perth gas is as follows:—Maximum, 28·82 candles; minimum, 27·70 candles; and average, 28·10 candles.

A private meeting of the Police Board of Greenock was held last Friday, when certain millowners and users of water power attended for the purpose of representing the objections held by them with regard to the rating clauses of the new Police Bill, which is now being promoted in Parliament. At present the users of water power are taxed for police purposes at the rate of 4s. per horse power. It is proposed to tax them henceforth on the annual value of their premises, or alternatively at the rate of 12s. per horse power. It is reported that the feeling of the meeting was not favourable to the views of the deputation.

It is understood that the opponents of the Perth Water Bill are most industrious in their endeavours to raise funds for the opposition in Parliament, and, as is not unfrequently the case in connexion with water bills, statements are being circulated that are not quite in accordance with fact. A statement has been issued by the Water Commissioners and the Committee of the Ratepayers, which concludes by saying that they consider themselves warranted in opposing the bill, and that they are convinced that the scheme proposed is not only unnecessarily extravagant, but is not well calculated to provide an additional water supply. It is intended to take the voice of the ratepayers on the subject by voting-papers.

In consequence of the Forgan Parochial Board, as the Local Authority of Newport, having delayed consideration of various schemes and proposals for a proper water supply for the village of Newport, a number of the inhabitants of the village have resolved to move in the matter. It is believed that the present supply of water is impure, and has been the cause of an outbreak of fever, and it is therefore considered necessary that this state of matters should be remedied without delay. A petition has been drawn up for presentation to the Board of Supervision, and it is now being

numerously signed. The memorialists seem to be in favour of having a supply of water from the Dundee Water Commissioners as soon as the Tay Bridge is completed.

A special meeting of the Police Commissioners of Thurso has just been held. The water assessment for the year was imposed at the rate of 1s. 6d. per £1 of rental, and the general opinion of the meeting was that the rate would require to be raised to 2s. 6d. per £1, so as to pay the instalments of the sum borrowed from the Public Works Loan Commissioners for the new water-works.

Large sales of pig iron have been, and are still being, made by speculators in the Glasgow pig iron market. Further reductions are expected, and hence holders are selling out their surplus as fast as possible. The past week closed with prices about 2d. per ton lower than on the previous Friday.

The coal market is very dull and lifeless. Shipping orders are very scarce, which is doubtless partly owing to the continuance of stormy weather. Prices are rather easier, but colliery owners are unwilling to reduce them any further.

Sale of Water Shares.—At the Auction Mart, London, on Wednesday last, one-tenth of a King's freehold share in the New River Company was sold at the sum of £9340, and 87 new £100 shares (£85 paid) for £26,090.

American Petroleum.—The shipments of petroleum from America last year, including about 40,000 barrels of Canadian oil, amounted to 236,751,446 gallons, against 221,710,049 gallons in 1875, and 222,869,010 gallons in 1874. The shipments appear to have been larger last year than in any previous twelve months; the increase is accounted for by large deliveries made to Japan and other Eastern markets.

Gas Explosion at Hull.—On Saturday week Mr. George Whitfield, the market keeper at the Hull Corn Exchange, found the gas was escaping in his back bedroom. He cut the pipe and fastened the end up. Soon afterwards he found that the gas was escaping in the front bedroom. He again cut the pipe and fastened the end up, but on applying a light to the pipe to see if it was all right, the accumulated gas under the boards exploded, smashing the windows, ripping the paper from the walls, and knocking down the ceiling of the room beneath. Mr. Whitfield was not injured.

Testimonial to Mr. Richard Hart.—We have much pleasure in recording the fact that at a meeting held in the Town-Hall, Folkestone, on Thursday last, a testimonial was presented to this gentleman, who has been long and actively connected with the gas and water supply of the town. The mayor presided on the occasion, and the Right Hon. E. P. Bouverie handed the testimonial to Mr. Hart. It consisted of a large massive elaborately chased silver salver, a silver-gilt vase with cover, two silver-gilt claret jugs, a chased silver flower vase of exquisite workmanship, a magnificent illuminated address in the shape of an album, covered with violet velvet with metal finishings, and with Mr. Hart's monogram, in pierced metal, and a cheque for £300. On the first leaf of the address, facing the title page, was the monogram "R. H.," in illuminated characters, and on the opposite side Mr. Hart's coat-of-arms, with the motto "*Via una cor unum.*" Then followed on the other page the address elegantly inscribed, and at its conclusion the names of upwards of 500 subscribers. The address read as follows:—"Record of a testimonial to Richard Hart, Esq., presented on Thursday, Jan. 25, 1877, at the Town-Hall of Folkestone, by the hands of the Right Hon. Edward Pleydell Bouverie. We, whose names are hereto appended, beg you to accept these pieces of silver plate, on which is inscribed, 'Presented to Richard Hart, Esq., on Thursday, Jan. 25, 1877, at a meeting held in the Town-Hall of Folkestone, his Worship the Mayor in the chair, by the Right Hon. Edward Pleydell Bouverie, on behalf of upwards of 500 subscribers, in testimony of the esteem of his friends and fellow-townsmen, and of their high appreciation of his eminent public services and private worth.' And the accompanying purse of money, also in testimony of our high appreciation of your private worth and public labours, and as a mark of the respect and affection in which you are held by your fellow-townsmen. Coming to reside in Folkestone about thirty years ago, you, in concert with the late Earl of Radnor, established the water-works, which have contributed so usefully to the sanitary improvement of this resort, and which undertaking has, by continued additions to the works, afforded a supply to the rapidly increasing population, and has ultimately become eminently advantageous to those who risked their capital on the faith of your administration; subsequently, although holding no official position in the corporation, you were associated with the town-clerk in introducing into Parliament the Folkestone Improvement Act, 1855, and were most instrumental in passing that measure in its various details; and when, at a later date, you became chairman of the directors of the gas-works, you caused those works to be removed from a site where they were a nuisance, to their present position, and while largely improving and extending the supply of gas, you brought the undertaking into a condition which is satisfactory and beneficial to the town; and by your foresight have secured such arrangements, that the company will be able to supply Folkestone, though it should increase to the extent which its most sanguine friends anticipate. But it is not merely as the originator and successful administrator of such and similar public works that we regard you with honour. We remember that, in your year of office as Mayor of Folkestone, in 1851, you rendered especial service to the town; you had the streets and drains improved, and you originated and continued other measures which laid the foundation of subsequent prosperity and progress. The national schools, the enlargement of the parish church, the establishment of the cemetery, are all works in which you have taken a leading part, and to which you have contributed time, money, and exertion, and no effort which your judgment has approved, to extend religious influence or educational agencies, or to promote the cause of the poor and needy, has ever wanted your cordial support, while in your public capacity order has been maintained and justice ably administered, For your indefatigable labour in endeavouring to bring about the proposed new road to Shorncliffe Station, we are grateful, and trust you may still be successful in accomplishing what we conceive will be of incalculable advantage to the town of Folkestone. We trust and hope that many long years of usefulness will yet be vouchsafed to you, and we tender to you and Mrs. Hart, and to your family, the respectful expression of our heartfelt good wishes."

The Effect of Gaslight on Plants may be studied to great advantage at the present time in the Royal Aquarium, Westminster. It will be remembered that this edifice was intended to provide the metropolitan public with an "aquarium and winter garden," and accordingly while the entire boundary line was fitted with tanks for the domestication of fishes, zoophytes, and the rest of the inmates of the aquarium, as the contrivance is now understood, certain of the inner spaces were appropriated to groups of plants, and Mr. John Wills, the celebrated horticultural decorator, made of the place a winter garden as rich and various as the general plan admitted, to the satisfaction both of the directors and the general public. But a change has come over the scene. It is a winter garden still; that is to say, we see it profusely furnished with decorations derived from the vegetable kingdom, but the furniture has no beauty because it has no health. We see, for example, great specimen palms with about half their leafage yellow with decay, instead of grassy green with life and vigour. We see everywhere dilapidated vegetation; we see a winter garden with an awful blight upon it, and we naturally ask ourselves for an explanation, derived from internal evidence, of the difference between the first state and the last state of that "aquarium and winter garden." It requires but a common-place comparison of the way in which the thing began with the way in which it is carried on to solve the interesting problem. The conditions have changed. When the Aquarium was opened, it was a reservoir of comparatively sweet air—sweet enough for palms, dracænas, cycads, and many other first-class furnishing plants that are well able to endure a few hardships, even to lack of ventilation, and occasional deficiency of water. The conditions have changed. Herein is the essence of the subject and the solution of the problem. Since the building was first dedicated to the services of the public, the consumption of gas has been increased about five times. At first there were few lights, now there are many. It was a wholesome plant-house originally, now it is in one sense at least—that is, as regards the drying of the air, and the diffusion of carbonic acid and sulphurous acid gases—an imitation of the "Black Hole of Calcutta." It is well known that living plants cannot endure for any length of time an atmosphere loaded with the gaseous products of combustion. In looking round a few days back, and noting the deplorable condition of palms, tree ferns, cycads, pandanads, and the smaller and softer stuff employed in the formation of picturesque groups, it was impossible to avoid the conviction that the illumination of the building is murder to the plants. It happened at the time to be warm and sunny weather, but we could not detect a chink of ventilation in the roof, although we felt with some degree of pain the aridity of the atmosphere: the floor dry as dust, and sending up dust so freely that the atmosphere of the place was of a diluted drab colour, as is usually the case in St. Paul's Cathedral, and other large edifices that are kept dry and subject to the moving of many feet on their floors. It is not for us to cast blame on any one, but it would be the merest squeamishness to conceal the fact that a place originally intended for a winter garden has really ceased to be a garden of any sort, for the profuse use of gas, the aridity of the floors and the general atmosphere, and the neglect of ventilation, are conditions favourable only to the cremation of plants, and not a few of them have apparently passed the final stage and are past recovery. But there is apparently no lack of devotion to his task on the part of the furnisher; we see baskets in various places so furnished that the value of the plants averages from £7 to £10 per basket, and a few days back we estimated the value of the lilies-of-the-valley in the flower-beds to be at least £30, and probably they would not last in a fresh state more than three days. When we turn to such furniture as tree ferns and other first-class decorative plants that are so largely employed, the waste of money in fighting the battle against gas, dust, and destructive drought is seen to be enormous. A glance at the stalls put up for the sale of toys, and at the gas-jets of many kinds that surround them, suggests that in preparing for Christmas there must have been some amount of night work in a heated atmosphere to aggravate the evil, and thus it is easy to account for the deplorable state of many of the finest plants in the place. The subject thus painfully illustrated is one of the utmost importance, and its interest increases every day. Aquariums and winter gardens are multiplying rapidly, and it is to be feared that in many instances the inevitable conditions will be found antagonistic to the primary idea. Promoters of these institutions may, therefore, be properly warned to consider, not only what is to be attempted in the first instance, but what is likely to follow as the plan expands. In the many excellent papers we have been enabled to present from the pens of the most experienced furnishing horticulturists, the lesson has been energetically repeated that a judicious use of water, with a somewhat free ventilation, are matters of the first importance in the preservation of plants in edifices lighted by gas. It is becoming customary to light private conservatories with gas, and the enjoyment of a plant-house is very materially enhanced by such a mode of illumination. But there must also be careful management of the atmosphere to ensure a sufficient degree of humidity, and to keep the whole body of air moving, and this, of course, can only be accomplished by means of the ventilators, which should be thoroughly adapted to the case. In the early days of the Westminster Aquarium, the plants suffered but slightly, but the reduction of watering and the increase of gaslight, have altered the conditions, and it is evident that to adapt the place to the requirements of crowds of visitors, the floral attractions must be abolished, or brought within the most narrow limits.—*Gardener's Magazine.*

Register of New Patents.

426.—Laidlaw, D., Glasgow, "*Improvements in lighting railway carriages and in the mechanism or apparatus employed therefor, the same being applicable for lighting tramway cars, ships, factories, and other buildings*" Application dated Feb. 2, 1876. (Void by reason of the patentee having neglected to file a specification of the Letters Patent.)

The invention essentially consists in an improvement in that class of apparatus commonly known as air-gas apparatus; that is to say, in which atmospheric air is converted into illuminating gas by passing it through a vessel or vessels containing a volatile hydrocarbon, such as gasoline.

As applied to railway carriages the apparatus consists of an air-pump driven by means of a tangent screw and worm-wheel from one of the axles of the carriage, by means of which a current of air is driven into an elastic or bellows-like reservoir, one or more of which reservoirs may be arranged beneath the seats of the railway carriage, or a van containing one such reservoir of larger capacity may be used. The reservoir is acted upon by weights or springs, so as to produce at all times a constant pressure on the contained air, and thereby cause it to flow out therefrom into the carburetter in a constant, steady stream. By means of the flexible reservoir the shocks due to the shaking motion of the carriage and the pulsations of the air-pump are absorbed, and the pressure of the weights or springs thereon causing the constant flow of air produces a steady flame at the burners, through which the carburetted air escapes from the carburetter. The carburetters may be arranged beneath the seat of the railway carriages, but they are, by preference, placed in one or more of the vans.

The same apparatus may be used for lighting steam or sailing ships, tramway cars, factories, and other buildings, and in any case where power is conveniently situated for driving the air-pumps.

In place of the flexible or bellows-like air-holder, a holder constructed after the manner of an ordinary gas-holder with a water-tank may be used.

In the case of conveying the gas from carriage to carriage in trains, the pipes forming the gas connexion between the carriages are fitted with water lutes instead of screw or analogous couplings.

In case of any emergency by which a train is caused to stand so that the supply of air is not kept up, one or more hand-pumps are fitted on the train, by working which the supply is kept up until it is re-started.

562.—Bray, H., Stoke Newington, and Groom, E., Russell Square, London, "*Improvements in the production of gas for illuminating and for heating purposes.*" Provisional protection only obtained. Dated Feb. 11, 1876.

This invention relates to the production of gas from fluid and from solid

excreta in conjunction with hydrocarbons or with other gas-producing materials, and consists in subjecting such fluid or solid excreta to the action of heat in conjunction with a hydrocarbon or other gas-producing material, the same being submitted to the action of heat in a gas-retort, and the gases resulting therefrom, being, if necessary, purified in the ordinary manner.

683.—NIEBUHR, J. F. W., Portland Place, London, "*Improvements in the manufacture of gas for lighting purposes, and in the means therefor.*" Patent dated April 27, 1876.

This invention relates to the manufacture of lighting gas from rice husks. The inventor states that hitherto it has been the practice to burn in an open fire or a furnace the husks of rice for the purpose of utilizing the heat therefrom, in combination with other fuel. It has also been the practice, where large works are situated, to throw the husks away as waste, and often a nuisance has been created thereby; but he has found by experiment that the husks of rice when burnt in a close retort are capable of producing a lighting gas of high brilliancy, and that it can be conveyed through pipes for general lighting purposes. The husks are, for the purposes of the invention, preferably placed in a clay or iron retort heated from the outside, and after the heat has been well applied a passage is opened to lead the gas from the retort to a gasometer, in which it can be stored, and from which ordinary street and other lamps can be supplied with gas. The husks may be placed in retorts in which a creeper screw can be worked to agitate the husks, and thus bring them gradually under the action of the heat for giving off the gas.

713.—PRIESTLEY, J. W., Halifax, "*Improvements in apparatus employed for heating or cooking purposes.*" Provisional protection only obtained. Dated Feb. 19, 1876.

According to this invention a Bunsen burner, or a burner of that class, is enclosed by, or received within, a tube or tubes of fire-clay, copper, or other metal, one end being open to the outer air, the other end being likewise open, but terminating within the heating or cooking apparatus. The heat resulting from the consumption of gas draws a current of air along the tube or tubes to, and in contact with, the flame, where by the more perfect combustion is effected and the heat greatly increased, and the noxious gases destroyed.

751.—WARNER, W. J., Gas-Works, South Shields, "*Improvements in apparatus for indicating and preventing the escape of gas from main-pipes and connexions, parts of which are also applicable to water-pipes.*" Patent dated Feb. 23, 1876.

This invention has for its object the reduction of loss by leakage which occurs in gas-mains, and in the junctions of services thereto, consequent upon the imperfection of the joints, or by fractures; and for means of readily testing the soundness of the same. In jointing the mains, the object is attained by increasing the flexibility of the mains through the improved formation of the joints, giving a greater longitudinal and a considerably increased axial freedom.

The invention consists, in the first place, of making the mains with a turned spigot and cast socket, the spigot being a plain cylindrical one, and the socket formed with two (or more or less) grooves of a V or taper or dovetail section. When the spigot is thrust into the socket the joint is made much in the usual way, with yarn and melted lead, which latter runs into the grooves, and retains a firm hold; but to prevent the yarn getting into the main, and to ensure a space between the end of the spigot and the bottom of the socket, a flanged ring or sleeve of lead may be used therein. Mains so jointed will, in consequence of the cylindrical form of the spigot, permit "drawing" to such an extent as to compensate for any expansion, contraction, or settlement in the mains, without destroying the soundness of the joint; or the socket may be bored, and the spigot left rough with a bead or beads, the joint being such as above described, to ensure greater freedom for settlement, and to allow, in the taking up of such pipes, the withdrawal of one from the other without destroying or injuring the pipes.

The invention, in the second place, consists in the construction of a clip or collar for the purpose of reuniting the ends of broken or fractured mains, and consists in casting the clips or collars in two longitudinal halves, the upper one of which is made with a plain longitudinal flange, and the other with a grooved one, so arranged as to clip the plain one just mentioned. The faces of the flanges and grooves are at a slight angle with the axis of the collar, or wedge shaped, so that when brought together and slid the one into the other, the two may clip and form a "thimble" or double socket around the pipe. The junction—a piece of sheet lead having been first placed round the two ends of the main—is then completed by caulking and running lead into the "thimble," filling it and the interstices between the flanges, a bead, beads, bosses, or studs being cast or formed on the inner side of the collar to strengthen the joint by clipping more effectually the enclosed pipe. Another advantage attending the use of these studs or small bosses is, that if they are cast full long, they may always be clipped off to suit the varying external diameter of pipes of the same bore to which they are applied. Instead of plain flanges and grooves, the collars may be formed with curved flanges, so as to lock into each other. These clips or collars may be made with one or more sockets or bosses cast or formed thereon, and into which other pipes or services may be inserted or screwed, without endangering the main-pipe by separation at the point of junction; they may be also made to serve most effectively in connecting ordinary branches to the mains, especially the smaller sizes. These clips may be made in more than two parts, and with one or more wedge-shaped pieces to fasten the whole together.

The invention, in the third place, has reference to the attachment to the collars before mentioned, or to ordinary mains, of a removable service or stand-pipe suitable for lighting market and other places, for taking pressures, or for any purpose where only occasional or periodical additional public lights or connexions are required. The apparatus consists of a vertical pipe, the lower end of which is fixed to the main or collar, and the upper end to a box something like a common syphon-box. Into this box is fastened a plate, having a plug or valve thereon. The valve or barrel is fitted to a fixed seat or plug capable of turning upon it, and is square on the outside, and of such size as to fit a collar made to slip over it, the joint between the collar and the plug being made gas-tight by the former being forced down upon an india-rubber washer by certain projections coming in contact with other projections formed in the interior of the top of the box which surrounds the valve and collar before described. The top of the box has a round hole, with notches or keyways on its opposite sides to admit of the projections or feathers on the collar passing through and on to the plug. To the collar is fixed the stand-pipe, which is provided with an ordinary stopcock and gas-burner or pressure-gauge at its upper end. The action of the apparatus is simple. When it is desired to make the attachment, a stand-pipe furnished with a collar, as described, is thrust down through the top of the box, and on being turned will fix or jam itself tightly, so as to remain firmly upright, and, at the same time, turn on the gas from the main beneath. The action of removing the pipe effectually shuts off the gas, thereby ensuring great security against fraud, and loss by leakage.

The invention, in the fourth place, consists in intercepting a line of main at any convenient spot by a box or chamber divided by partitions, so as to constitute a hydraulic valve, and a case in which a meter wheel may revolve, the revolutions of such wheel, and consequently the quantity of gas passed through it, being indicated upon an index attached to the case for this purpose. The arrangement is such that when no test is being proceeded with the gas will pass by the meter without actuating it; but on a test being desired, all that is necessary is to pour water into the box or chamber sufficient to seal the valve, when the gas will be compelled to pass through the meter, and thus register its quantity. The same result may be arrived at, though not so conveniently, by introducing an ordinary hydraulic valve at any suitable place along the long the line of main, and attaching one of the valves or connexions, described under the third head of this invention, to the main on each side of it. If a temporary connexion is then made between these two valves and an ordinary meter of sufficient capacity, and the hydraulic valve is sealed, the gas usually flowing at this point will be compelled to pass through the meter, when its quantity may be ascertained by an inspection of the index.

759.—GILLETT, J., Melksham, Wilts, "*Improvements in steam-pumps.*" Patent dated Feb. 23, 1876.

This invention is designed to make a single-acting steam-pump capable of working evenly or nearly so at different pressures. For this purpose with the main steam valve, whereby the admission of steam to and from the respective ends of the piston is governed, there is combined a supplementary valve, and means are provided for adjusting, from without the steam chest, the position of such supplementary valve relatively to the aperture in the main valve through which steam is admitted to the cylinder, for effecting the up-stroke of the piston. The valve rod passes through a stuffing-box or gland at each end of the valve chest, and is arranged to admit of being rotated without affecting the position of the main valve, but so as, by means of a screw thread or worm on the rod, to move the supplementary valve more or less over the aperture in the main valve.

796.—BREWER, E. G., Chancery Lane, London, "*A new or improved pump.*," A communication. Provisional protection only obtained. Dated Feb. 25, 1876.

This invention essentially consists in the construction of pumps with two or doublescrews. The lower screw may be a screw with, say, four fans, each fan forming the quadrant of a circle. The rise or pitch of the screw may be varied according to the size or special requirements of each individual case. It is surrounded by a cylinder, above which there is a conical casing containing a screw with, say, four fans or blades, having a rise or pitch preferably larger than that of the lower screw, and in opposite direction. This screw may be a fixture, an arrangement found to be preferable for large pumps, especially where gravel and sludge or slush has to be raised with the water, but where water alone has to be raised a modified arrangement is in some cases advisable. Above the screw there is a stuffing-box to prevent the return of water, gravel, or slush through the centre. The driving rod to which the lower revolving screw is keyed is steadied by bearings where requisite, the number being regulated according to the depth of tube.

799.—HOWARD, J., Peckham, Surrey, "*Improvements in automatic apparatus for regulating the flow of fluids under pressure, and prevention of waste of water.*" Patent dated Feb. 26, 1876.

According to these improvements, to the main water supply tap is attached an apparatus constructed substantially as follows:—A cylinder of brass or other material having one end closed by a cover, through which is an outlet to which a tap can be attached, is fitted with two metal discs, both of them having a seating turned at one end, or a leather washer attached, one of them having a cup leather secured to the reverse end. This disc, which it is preferred should be solid, has a hole drilled through it, which is partially closed with a regulating screw. The cylinder containing the discs is fixed above the water-way of a cottage or other valve having a seating. When water is allowed to enter the pipe leading to the seating, it forces the two discs into the cylinder, and the water passes through the water-way; the upper discs being held firmly against the top of the cylinder closes the outlet through the cover, and the water forcing through the hole in the other disc pushes it down upon the seating of the water-way pipe, closing it. When the main supply tap is closed, the upper disc frees itself from the outlet, and returns to its original position. The cylinder is sometimes placed below the valve, in which case only the disc fitted with a cup leather is used, and the way through it is closed, the water to raise it being admitted by a tube attached to the water-way pipe.

831.—M'EVOY, C. A., Piccadilly, London "*Improvements in gas lighting apparatus.*" Provisional protection only obtained. Dated Feb. 28, 1876.

This invention has for its object to construct taps for gas-burners in such manner that each time the tap is turned on the gas issuing shall be immediately ignited. For this purpose there is combined with the tap handle an electrical contact maker, in such manner that each time the tap is turned connexion shall be established between two wires leading from the opposite poles of a battery, and an electical current thereby caused to pass through a platinum wire or fuse above the burner, and ignite the gas. The metallic pipe by which gas is supplied may itself serve as one of the conducting wires from the battery, whilst an insulated wire is employed for the other. By this means each time gas is turned on it is at once ignited; and so soon as the tap handle is relieved from the pressure of the fingers upon it the current of electricity ceases to pass, so that the wire or fuse employed is only in action at the time required for lighting the gas.

832.—JENKIN, F., Edinburgh, "*Improvements in apparatus for regulating the flow of fluids.*" Patent dated Feb. 28, 1876.

The object of this invention is to regulate the flow of fluids in such a way that either a constant flow shall be maintained through a given pipe, or a constant pressure shall be maintained in it, as may be desired.

If the constant flow is required, the fluid is admitted into a chamber by an equilibrium valve of simple construction, separated from a second chamber by a horizontal partition through which a vertical plunger connected with the equilibrium valve works freely. When the plunger is at the bottom end of its range the valve is open, when it is at the top the valve is shut, and at intermediate points the valve acts as a throttle valve, reducing the flow as the valve rises.

The position of the plunger depends on the difference of pressure between the two chambers; the difference of pressure multiplied into the area of cross section of the plunger gives the total force tending to lift the plunger. When this force is equal to the weight of the plunger, the latter remains poised in equilibrium; if the difference of pressure increases, the plunger rises, throttles the fluid so as to reduce the pressure in the first chamber, and assumes a new position of equilibrium. The difference of pressure may be caused by an increase of pressure outside the valve or by a decrease of pressure in the second chamber; the effect is the same in both cases. Quite similarly if the difference of pressure decreases, the plunger and valve fall so as diminish the throttling action. The difference of pressure is therefore maintained constant within such limits as are within the control of the throttle-valve. A constant sized opening is provided between the two chambers, and through this the constant difference of pressure will produce a constant flow. Thus the head on either side of the valve may

vary within wide limits, and yet the flow past the valve will remain constant. The opening between the chamber may be the annular space round the plunger, so as to diminish the friction. In any case it may be made adjustable, so that any desired flow may be obtained.

842.—JENSEN, P., Chancery Lane, London, "*Improvements in liquid and fluid meters.*" A communication. Patent dated Feb. 29, 1876.

According to these improvements the liquid or fluid enters the meter by a pipe at the bottom of the case, and leaves by a pipe preferably at one side. The inlet-pipe extends up within the case, and at the end there is a meter wheel that is upon a shaft free to rotate and move endwise in its bearings, and upon the periphery of the meter wheel are wings that extend down around the outside of the inlet-pipe. These wings are placed at an inclination, so that the water issuing laterally from the space between the meter wheel and the end of the pipe strikes thme and gives rotation to the wheel. The portions of the wings below the top of the inlet-pipe move in quiescent water, and hence form a resistance which lessens as the valve rises by the increased flow of water moving the wheel endwise, and hence the speed of revolution will be increased in proportion to the quantity of water flowing, and the registration will be accurate. There is a conical deflector at the end of the inlet-pipe to direct the water out horizontally; this is preferably upon a stationary stem and placed above the end of the inlet-pipe within the meter wheel, but it may be attached to it. One set of wings may be resisting and the other set propelling, or the wings may all be made alike, and act to propel at the upper part and resist at the lower.

847.—ELLIOTT, A., and BURNETT, C., Stockton-on-Tees, "*Improvements in actuating regulating valves for steam, water, gas, and other purposes.*" Provisional protection only obtained. Dated Feb. 29, 1876.

This invention consists in certain improvements for facilitating the opening and shutting of valves. For this purpose a crank or eccentric is used in combination with an ordinary mushroom or other suitable form of valve, so arranged that the turning of the crank or eccentric to a certain extent in one direction shall open the valve, and the turning of it in the other direction shall shut it. The crank or eccentric is connected with or forms a part of a spindle, which passes through a stuffing-box, and to which a hand wheel or lever handle may be fixed, by means of which the valve can be opened or shut. It is preferred to make the throw of the crank or eccentric in excess of the travel of the valve, so that the valve may be opened before the crank or eccentric has made half a revolution.

848.—BANKS, C., Birmingham, "*An improved tap for water and other liquids.*" Provisional protection only obtained. Dated Feb. 29, 1876.

The object of this invention is so to construct a tap for water and other liquids that the pressure or flow itself may be the means of closing and (until released) keeping closed the valve. This is done by bringing the flow directly upon the valve, and the means employed are as follows:—A piece of tubing so constructed or jointed as to form an elbow, is attached to the supply-pipe, and enlarged sufficiently to allow of the valve seating being formed. Against this seating comes the stop valve, which is constructed of any suitable material, and the flow of liquid constantly pressing this valve upon its seating, the normal tendency of the tap will be to be closed, and the greater the pressure of water the more securely will the tap be closed. Attached to the valve is a rod, which is passed outwards through the elbow joint, and by means of this, when it is desired that liquid shall flow through the tap, the valve is pressed away from its seating, and thus liquid is free to flow through the tap. When it is desired to stop the flow, nothing is needed but to release the pressure applied, when the stream acting directly upon the valve stops the supply.

858.—STRONG, M. H., Brooklyn, U.S.A., "*Improvements in the manufacture of gas for illuminating and other purposes.*" Patent dated Feb. 29, 1876.

This invention is for making gas from petroleum or similar oils. There is a vertical retort filled, or partially so, with pieces of brick; these are heated to a high temperature by petroleum admitted and burned in the presence of a blast of air, preferably heated. The products are allowed to escape by a valve into a chimney; the air supply and the valve to the chimney are now shut, and the supply of petroleum is continued. The result is that the hydrocarbon is decomposed, most of the carbon deposits upon the bricks, and the hydrogen passes through the retort to a hydraulic main and gasholder. When the bricks in the retort become of too low a temperature the petroleum is shut off, the chimney damper opened, and the blast of hot air again sent through the retort, and the same is highly heated by the combustion of the carbon that had been deposited upon the bricks. When this has been consumed, the gas-making operation is resumed as before, and so the processes of gas-making and heating alternate.

It is preferred to use two retorts and two chimneys, and to alternate the opperations. The heat from the combustion of the carbon deposited in one retort heats the bricks in the other retort, and burns out any carbon deposited in the flue connecting the two retorts.

The air used may be heated by pipes immersed in the coal tar that is used for the seal in the hydraulic main.

Where desired a jet of steam may pass in with the petroleum while the gas-making operation is going on, and a second supply of petroleum may be introduced into the flue, between the retorts, to produce olefiant gas to mix with the hydrogen from the retort. The retorts are to be covered with non-conducting material to retain the heat.

APPLICATIONS FOR LETTERS PATENT.

169.—TONGUE, J. G., Chancery Lane, London, "Improvements in means and processes for obtaining colouring matters from cannel, anthracite, and other coals, applicable to various useful purposes." A communication. Jan. 12, 1877.

196.—GIROUD, H., Paris, "Improvements in rheometric regulators for gas-burners." Jan. 15, 1877.

209.—WATERSON, H., Birmingham, "Improvements in ratchet braces." Jan. 16, 1877.

245.—HARRIS, J., Montreal, Canada, "Improvements in rotary pumps and engines, which improvements are also applicable to rotary fans or blowers, and to the transmission of motion or power." Jan. 18, 1877.

258.—NAWROCKI, G. W. VON, Berlin, "Improvements in apparatus for raising fluids." A communication. Jan. 19, 1877.

259.—TASSIE, P., Manchester, "Improvements in means or arrangements for closing the mouthpieces of gas-retorts, and in tools for applying the same." Jan. 20, 1877.

263.—HOUZEAU, J., DEVEDEIX, E., and HOLDEN, J., Rheims, France, "A system of purifying town sewage and waters previously used in industries." Jan. 20, 1877.

272.—WALLACE, R. W., Battersea Park, and CLAUS, C. F., Great St. Helen's, London, "Improvements in the purification of gas, and the utilization of bye-products by the manufacture of secondary products therefrom." Jan. 20, 1877.

308.—BREWER, E. G., Chancery Lane, London, "Improvements in taps or valves." A communication. Jan. 24, 1877.

315.—DUFRENÉ, H. A., Paris, "Improvements in burners for mineral and other oil, vapour, and gas." A communication. Jan. 25, 1877.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

3010.—SMITH, W., San Francisco, U.S.A., "Improvements in fluid-meters or engines for measuring or obtaining power from water, air, or gas." July 26, 1876.

3073.—MAGNIAT, H. L., Paris, "A new or improved steam, gas, and water tight metallic joint." Aug. 1, 1876.

3376.—SIEH, P., and SCHWARZ, T., Hamburg, Germany, "Improvements in gas regulating and saving apparatus." Aug. 28, 1876.

4085.—SIEVIER, J. C. H., Holloway, London, "Improvements in the manufacture of gas, and in the apparatus to be employed therein." Oct. 23, 1876.

4459.—GENT, P., Congleton, Chester, "Improvements in and appertaining to gas stoves." Nov. 18, 1876.

4519.—GREENHILL, W., Hampton Court, Middlesex, "Improvements in connecting service-pipes with drains to prevent sewage gases entering buildings." Nov. 21, 1876.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

77.—FOTTRELL, J., "Improvements in artificial stone pipes and tubes, and in the coating or lining thereof, to render them suitable for the conduit of alkaline liquids and acid products from chemical, manure, and gas-works, for sewage, saline liquids, and gas." Jan. 7, 1874.

84.—BROOKES, W. H., "Improvements in pumps." Jan. 7, 1874.

121.—BENSON, M., "Improvements in pump-valves." Jan. 9, 1874.

138.—JENSEN, P., "New or improved modes of and means and materials for the manufacture of gasholders and other vessels." Jan. 10, 1874.

207.—HUERNE, P., "An improved self-cleaning water filter and connexions." Jan. 16, 1874.

219.—GRIFFIN, J. T., "Improvements in the construction of wrenches for turning pipes, bars, and other similar articles." Jan. 16, 1874.

232.—FORBES, G. H., "Improvements in the purification of gas." Jan. 17, 1874.

239.—BROADFOOT, J., "Improvements in pumps." Jan. 19, 1874.

242.—GEDGE, W. E., "Improvements in gas-burners with lateral and covered jets." Jan. 19, 1874.

246.—VAUGHAN, E. P. H., "Improvements in apparatus for generating inflammable gas by the carburization of atmospheric air." Jan. 19, 1874.

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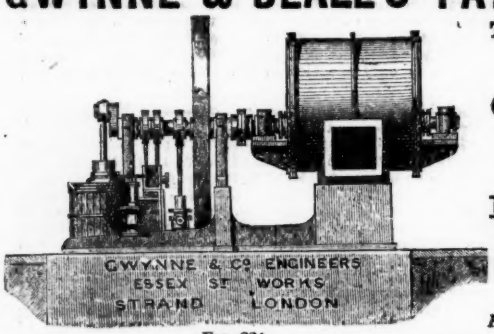

FIG. 224.

The BEST EXHAUSTERS IN THE WORLD.

GWYNNE & CO.

HAVE MADE THE

LARGEST AND MOST PERFECT

EXHAUSTING MACHINERY

Ever produced, and the most economical in working.

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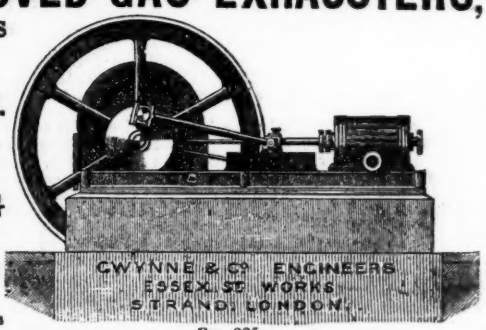


FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND CO. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

REGULATORS, BYE-PASSES, STOP-VALVES, GAS-VALVES, & MACHINERY FOR GAS MANUFACTURE, OF ALL SIZES,

CAN BE HAD ON APPLICATION TO

GWYNNE & CO., HYDRAULIC & GAS ENGINEERS, ESSEX STREET WORKS, STRAND, LONDON, W.C.

G. & Co. are now manufacturing for a London Gas Company three of their 210,000 cubic feet Patent Gas Exhausters, and many of all sizes.

WANTED, an appointment as Manager of Gas-Works, at home or abroad. Many years experience, and can prepare plans.
Apply to JOHN STEARS, HULL.

WANTED, a Gentleman, calling upon Gas Companies and others, to undertake a COMMISSION for the Sale of Wet and Dry Gas-Meters.
Apply to JAS. MARSH AND SON, Bank Meter-Works, OLDHAM.

WANTED, Spent Oxide. The Sheffield Chemical Company, Attercliffe, are prepared to PURCHASE large or small quantities.
Address, with particulars, the Proprietors, HORNBY, FAIRBURN, AND CO.

WANTED, by a married Man, a situation as MANAGER of a Gas-Work. Make about 8 or 10 million per annum. Understands gas-fitting, meter-fixing, mains and services, and the manufacture and distribution of gas generally. Aged 40.
Address No. 343, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

BELFAST CORPORATION GAS-WORKS.

WANTED, two experienced Retort- SETTERS. To suitable men, liberable wages and permanent employment would be given.
Applications, accompanied by references to previous employers, must be addressed to
JAMES STELFOX, Manager.
Jan. 25, 1877.

CROYDON COMMERCIAL GAS AND COKE COMPANY.

WANTED, by the above Company, a sober, steady, and experienced MAIN and SERVICE LAYER. None but those accustomed to large mains need make application.
Apply, stating age and experience, with copies only of testimonials from present and last employer, to ROBERT WILSON, Chief Inspector, 22, George Street, CROYDON.

WANTED, by the Directors of the St. Anne's-on-the-Sea Gas Company, Lancashire, a competent person to take charge of a small Gas-Work. The works are in course of construction. He will be required, in addition to the management of the works, to lay gas-mains, connect service-pipes and meters, and make himself generally useful. State salary required.
Applications, with testimonials, to be sent in sealed and addressed to the Chairman of the Gas Company, not later than Monday, the 8th day of February next.
By order,
W. J. NUTTER, Secretary.
St. Anne's-on-the-Sea, Lancashire, Jan. 25, 1877.

RETORT SETTER.

WANTED, a thoroughly experienced Man as RETORT SETTER, and to do the general repairs pertaining to a Gas-Work.
Applications to be made to the MANAGER, Corporation Gas and Water Works, BARROW-IN-FURNESS.

TO DRY GAS-METER MANUFACTURERS.

WANTED, a situation as Metal Caster, by the Advertiser, who has had 18 years experience in Thomas Glover and Co.'s system. Is acquainted with the various metals used in the manufacture of Gas-Meters.
Address No. 340, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED.—The Malvern Local Board require an ASSISTANT to the Surveyor and Gas Manager. Salary 35s. per week.
Full information respecting the duties may be obtained of the Surveyor and Gas Manager, Mr. J. E. Palmer, Local Board Office, Malvern.
Applications, with testimonials, to be sent to the undersigned, on or before Monday, the 5th day of February next.
By order of the Board,
WM. WILKES CAWLEY, Clerk.
Local Board Office, Malvern, Jan. 22, 1877.

WANTED, by the South Shields Gas Company, an active, steady, practical Man, as SUPERINTENDENT of the Company's Jarrow Station. As it is in the course of erection, he must have had experience in the construction as well as management of Gas-Works. Salary to commence at £100 a year, with house, coal, and gas.
Copies only of testimonials to be sent, and application made, to the Company's Engineer,
W. J. WARNER.
South Shields, Jan. 25, 1877.

WANTED.—The Directors of the Farn- worth and Kearsley Gas Company are open to treat with a fully competent Man to erect and complete their new Stack of Ovens for 126 Retorts; the Company to find all materials used in the construction of same.
Application to be made to the Manager, at the works, from 10 a.m. to 4 p.m.; or, if by letter, to the same address. The time allowed for making application will be closed after the 7th day of February next. None but fully competent persons need apply.
JOHN SMITH, Manager.
Jan. 27, 1877.

FOR SALE, a Set of 6-in. Vertical CONDENSERS, with tar-box and all connexions complete.
May be seen, and price obtained, on application to the Southbank and Normanby Gaslight and Coke Company, Limited, Southbank, YORKSHIRE.

THE GASLIGHT & COKE COMPANY.
NOTICE is hereby given that a HALF-YEARLY ORDINARY GENERAL MEETING of the PROPRIETORS in this Company will be held at this Office, on FRIDAY, the 9th day of February next, at Twelve o'clock (noon) precisely, to transact the usual business, including the declaration of a Dividend for the half year ending the 31st day of December last, and to elect Directors and Auditors in the place of those who will at such Meeting go out of office.
NOTICE is hereby also given that, pursuant to the Standing Orders of both Houses of Parliament, an EXTRAORDINARY GENERAL MEETING of the said PROPRIETORS will be held at the same Office, immediately after the said Meeting, when a Bill, to be introduced into Parliament, intituled "A Bill to Repeal certain Provisions of The Gaslight and Coke Company Act, 1876, with respect to the Purity of Gas supplied by that Company," will be submitted to the Proprietors then present, either in person or by proxy, for their approval.
By order,
JOHN ORWELL PHILLIPS, Secretary.
Chief Office, Horseferry Road, Westminster, S.W.,
Jan. 24, 1877.

APPOINTMENT WANTED.

THE Son of a Gas Engineer desires an APPOINTMENT as an ASSISTANT to a Manager or Engineer of Gas-Works. Is 20 years of age. Five years experience in keeping carbonizing accounts, using photometer daily, and testing for sulphur compounds, &c. Is a fair draughtsman. Moderate salary.
Address No. 337, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

BOILERS.

FOR SALE, Cheap, Two 5-h.p. Cornish BOILERS, in good condition. May be seen at the Reading Gas-Works.
Particulars can be obtained of Mr. E. BAKER, Engineer.

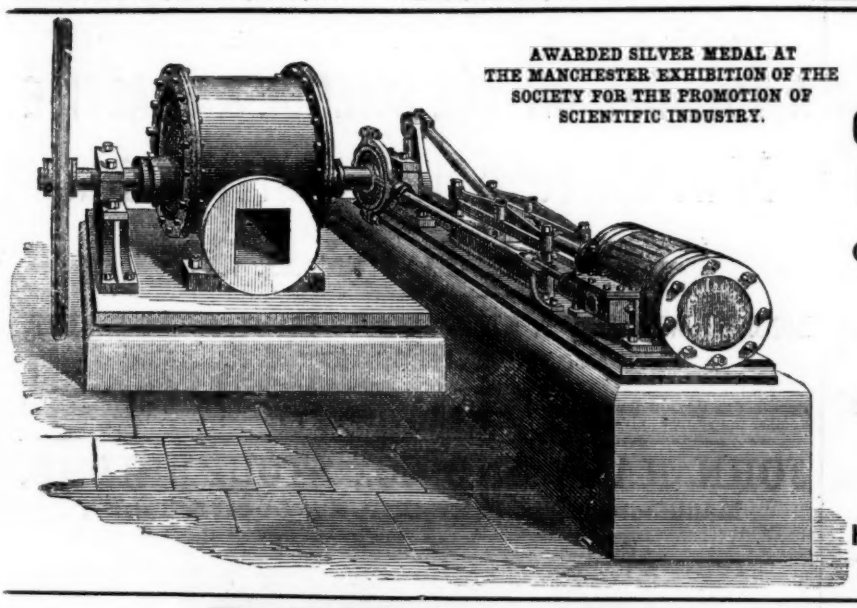
FOR SALE.—A Station-Meter made by Croll, 1872, never used. Capable of passing 2000 feet of gas per hour, with dial; 6-in. outlet. To be sold very cheap.
Apply to MANAGER, Gas-Works, Dunmow, ESSEX.

PAMPHLET ON GAS.

COOKING AND HEATING.
HINTS ON GAS-BURNERS, &c.

For GAS COMPANIES to distribute to their Gas Consumers.

Specimen Copy by post Threepence, from the Author,
MAGNUS OHREN, Gas-Works, Sydenham, S.E.



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STROUD, GLOUCESTERSHIRE.

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ENGINEERS,
FOUNTAINBRIDGE WORKS, EDINBURGH,
MANUFACTURERS OF **WET AND DRY GAS-METERS;**
Patentees and Sole Manufacturers of "PEEBLES' GAS-GOVERNORS,"
FOR STATIONS, DISTRICTS, DWELLING-HOUSES, AND PUBLIC LAMPS,
OF WHICH UPWARDS OF 90,000 ARE NOW IN SUCCESSFUL USE.
"These Lamp-Governors are so superior that they are likely to supplant all others."—*Dr. Wm. Wallace, F.R.S.E., F.C.S.*

THE WIGAN COAL & IRON COMPANY,
LIMITED,
DISTRICT OFFICE: 18, BENNETT'S HILL, NEW STREET, BIRMINGHAM; AGENT: W. M'GOWAN;
Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.
N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known
HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

FOR SALE—A 10 ft. Gasholder (second-hand), with metal tank, columns, pulleys, and weights, now erected and in working order. Suitable for a small factory or private residence.
Apply at LINTZFORD MILL, Lintz Green, near NEWCASTLE-UPON-TYNE.

TO BE DISPOSED OF, a most lucrative Gas Engineering Business. Also, combined with same, a good current-going Plumbing, Brass Finishing, Tinsmith, and Ironmongery Business. The whole has been successfully carried on for a number of years. Reason for disposal proprietor deceased. Premises in central part to let. Machinery, &c., to be taken at valuation.
Apply, 69, Clayton Street, NEWCASTLE-ON-TYNE.

THE Swansea Gaslight Company have for immediate SALE, the following Plant:—
A 6-h.p. Patent Trunk Engine. (Beale.)
Exhauster to pass 15,000 feet per hour. (Beale.)
An 8-h.p. Grasshopper Engine. (Easton and Amos.)
Exhauster, 20,000 ft. per hour. (Beale.)
Tar, Liquor, and Water Pumps, Eccentrics, Shafting, and Driving Pulleys.
Wrought-iron Condenser, six vertical Legs, 30 ft. high, 24 in. by 6 in., with tar-boxes, dips, and syphons.
Wrought-iron Scrubber, 5 ft. diameter, 20 ft. high.
A set of four cast-iron Purifiers, 12 ft. square by 5 ft. deep, with galvanized wrought-iron covers, lifting apparatus, four tiers of wooden sieves, 10-in. connexions and valves.
May be seen at the Gas-Works, Swansea. The whole in perfect working order; replaced by plant of larger dimensions.
Further particulars may be obtained on application to Mr. THORNTON ANDREWS, SWANSEA.

SHREWSBURY GAS COMPANY.
THE Directors are desirous to receive TENDERS for the surplus TAR and AMMONIACAL LIQUOR produced at their works for a term of three years, from July 1, 1877. Particulars as to quantities made may be had on application.
Tenders to be sent in separately for Tar and Water, at per ton of 2240 lbs., before the 20th of February next.
By order,
Jan. 27, 1877. S. B. DARWIN, Secretary.

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THE TWENTY-EIGHTH VOLUME
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Tables, Rules, and Useful Information for Gas Engineers, Managers,
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THE Vale of Neath Dinas Fire-Brick and Cement Company, Limited, Pontwalby Works, Glyn Neath, South Wales. Manufacturers of the Celebrated Genuine Dinas Fire-Bricks and Cement for Siemens's Regenerative Gas Furnaces, Bessemer Converters, Copper Smelting, Roofs of Puddling Furnaces, Glass-Works, Gas-Works, Coke Ovens, and processes involving intense and long-continued heat. Prices and estimates on application.
London Agency, 11, Queen Victoria Street, City.

TO INVENTORS AND PATENTEES.
MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.
Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.
Patents procured for Foreign Countries.
Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

TO GASHOLDER MAKERS.
THE Directors of the Rastrick Gas Company are desirous of receiving TENDERS for the construction and erection of a Single-Lift GASHOLDER, 90 ft. diameter and 20 ft. deep.
Plans and specifications may be seen at the Company's Offices, Bird's Royd, Rastrick, on and after Thursday, the 8th day of February, 1877.
Sealed tenders endorsed "Tender for Gasholder," to be sent to the undersigned not later than Saturday, the 17th day of February, 1877.
The Directors do not bind themselves to accept the lowest or any tender.
JOHN TETLOW, Secretary.
Rastrick, Jan. 24, 1877.

SKELMERSDALE GAS-WORKS.
CONTRACT No. 3.
THE Skelmersdale Local Board are pre- pared to receive TENDERS for the supplying and delivering at Skelmersdale Station (Lancashire and Yorkshire Railway, Rainford and Ormskirk Branch) of about 10,000 lineal yards of Cast-Iron GAS-MAINS, with turned and bored joints, and special pipes in connexion therewith.
Copy of specification, schedule, and form of tender, and all information, may be obtained (on payment of two guineas, which will be returned on receipt of a *bonâ fide* tender) on application to the Engineers to the Board, Messrs. Goodison, Atkinson, and Forde, Orange Court, 35A, Castle Street, Liverpool.
Sealed and endorsed tenders to be sent to the Clerk's Office on or before the 12th day of February.
The Board do not bind themselves to accept the lowest or any tender.
WILLIAM PARR, Solicitor, Clerk to the Board.
Ormskirk, near Liverpool.

MANCHESTER CORPORATION GAS-WORKS.
TO TAR DISTILLERS AND OTHERS.
THE Gas Committee are prepared to receive TENDERS for the purchase of the whole or portion of the GAS TAR to be produced at their Gaythorn and Rochdale Road Works for the term of one or more years, as may be agreed upon, commencing on March 1, 1878. The total quantity that will be produced during the first year is estimated at 15,000 tons or thereabouts.
Sealed tenders, addressed to the Chairman of the Gas Committee, City Hall, and endorsed "Tender for Gas Tar," must be delivered at this Office on or before the 20th day of March next.
The Committee do not bind themselves to accept the highest or any tender.
Further particulars as to conditions of contract, and forms of tender may be obtained on application to Mr. Jackson, at the Gas Office.
By order of the Gas Committee,
JOSEPH HERON, Town Clerk.
Gas Office, City Hall, Manchester, Jan. 27, 1877.

OVER DARWEN LOCAL BOARD OF HEALTH.
GAS AND WATER DEPARTMENT.
THE Gas Committee are prepared to receive TENDERS for the supply of 105 FIRE-CLAY RETORTS, and the necessary Fire-Bricks, Tiles, and Fire-Clay for same.
Sealed tenders, endorsed "Tender for Retorts," &c., must be sent in not later than Twelve o'clock on Wednesday, Jan. 31, 1877, addressed to the undersigned, from whom specifications and other particulars may be obtained.
The lowest tender not necessarily accepted.
JOHN MARSLAND, Engineer and Manager.
Gas-Works, Darwen, Jan. 15, 1877.

FLEETWOOD GAS COMPANY, LIMITED.
THE above Company are prepared to receive TENDERS for the following:—
CONTRACT No. 1.—For the Supply and Fixing Cast-Iron Tank, 46 ft. diameter, 26 ft. 6 in. deep, with connexions, valves, &c.
CONTRACT No. 2.—For Re-erecting and Deepening a Gasholder, 45 ft. diameter, 16 ft. deep (to be enlarged to 26 ft. deep), supplying Cast-Iron Columns, &c., &c.
CONTRACT No. 3.—For making Concrete Bottom and Building Brick Piers, &c., &c.
Plans and specifications may be inspected at the works of the Company, Fleetwood, and any further particulars obtained from Mr. J. T. Hall, C.E., Prescot.
Tenders to be sent to the Engineer, Prescot, not later than the 10th of February.
The Directors do not bind themselves to accept the lowest or any tender.
BY ORDER.
Fleetwood, Jan. 8, 1877.

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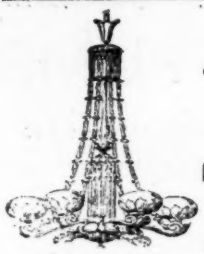

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And every Description of Gas Apparatus.

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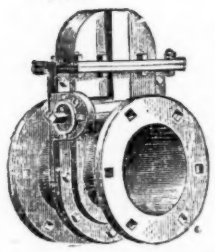

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List of prices, with full dimensions of all sizes up to 48-inch, to be had on application.

These Valves are all proved on both sides to 30 lbs. on the square inch before leaving the works, and are always kept in stock.

VALVES MADE WITH OUTSIDE RACKS TO ORDER.

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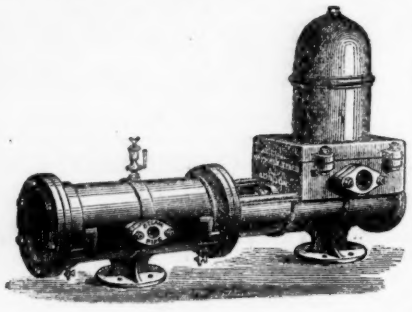

(From B. Vickerman and Sons, Huddersfield.)

To Messrs. Hayward Tyler and Co. *Huddersfield, Jan. 5*, 1877.

Dear Sirs,—In reply to yours of the 4th inst., we beg to say that the Steam Pump answers perfectly well as a Steam Fire-Engine. It has now been in use over four years, and we find it to answer quite as well as it did at first.

Yours truly,

(Signed) *Pro* B. Vickerman and Sons,
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Ponder's End Brewery, March 4, 1876.

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Gentlemen,—I beg to acknowledge the receipt of your favour with reference to the "Universal" Steam Pump I have now in use, and has been for some years. I have much pleasure in recording my humble testimony to the value and importance of the "Universal" Steam Pump to brewers, &c., &c. It is the most perfect and simple Pump I have ever seen, seldom or never getting out of order, and the next time I am in town I intend to call upon you and order another. You are at liberty to make what use you think proper of this letter.

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Henry Greene and Son, 155, Cannon Street, London, Sole Agents for Great Britain, Ireland, and Colonies, of Brönner's Improvements in Gas Lighting, beg to inform the public that on the 13th of January, 1876, Julius Brönner obtained an injunction in the Court of Session, Scotland, against Donald M'Vean, Gas-Fitter, 14, Newton Street, Glasgow, prohibiting him from in any way advertising or offering for sale as Brönner's Burners, any Burner not manufactured by Julius Brönner, or from in any way inducing the public to believe that the said Donald M'Vean sells or keeps for sale Brönner's Burners, manufactured by Julius Brönner, while such is not the case.

Also that on the 9th of November, 1875, he obtained injunction in the same Court, and in the same terms, against R. M. Brechin and Co., 46, North Hanover Street, Edinburgh.

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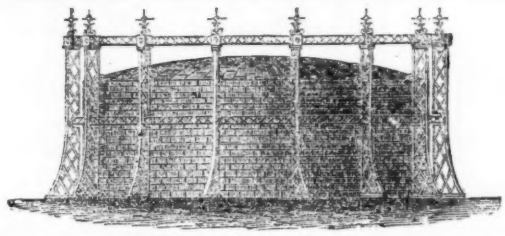

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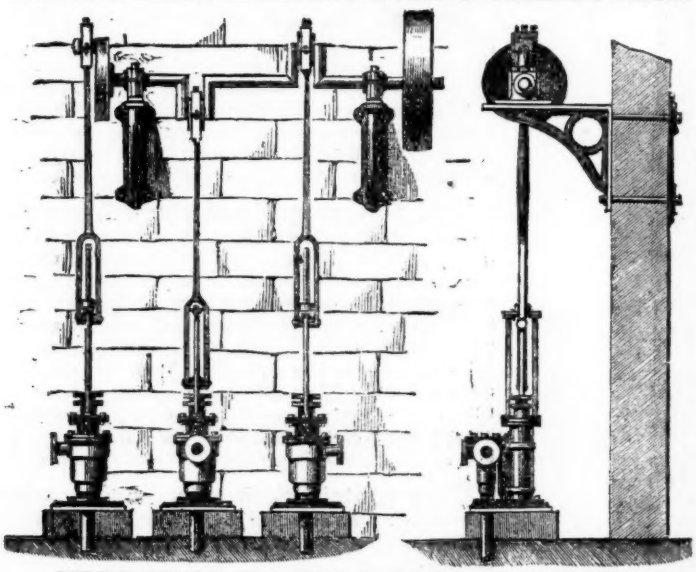

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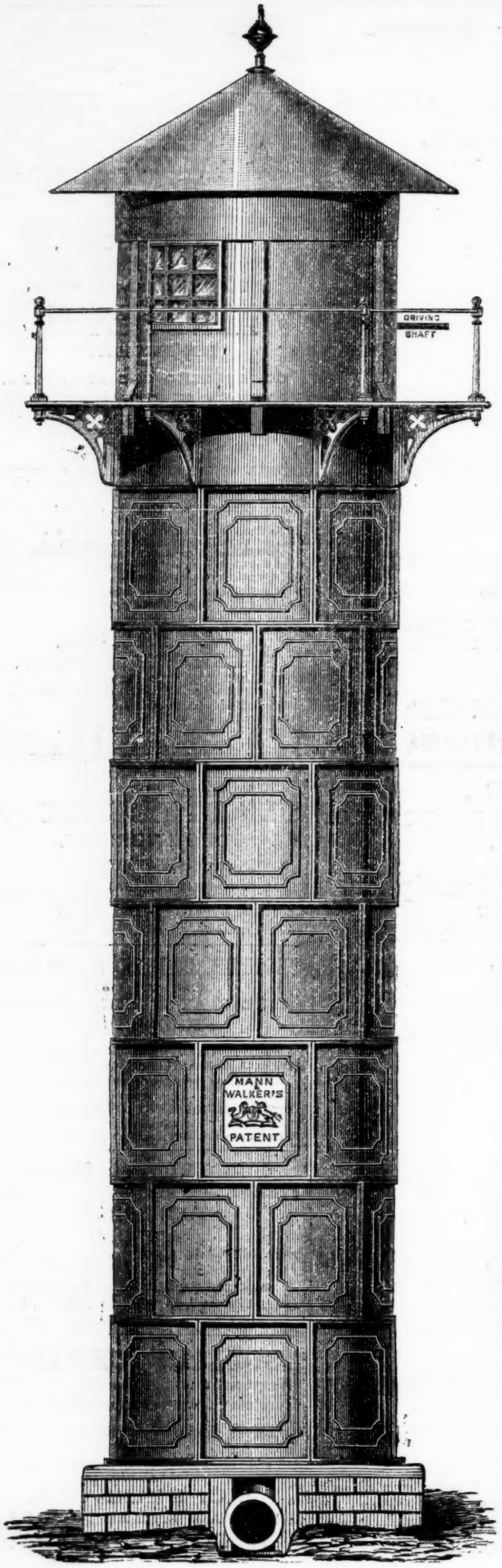

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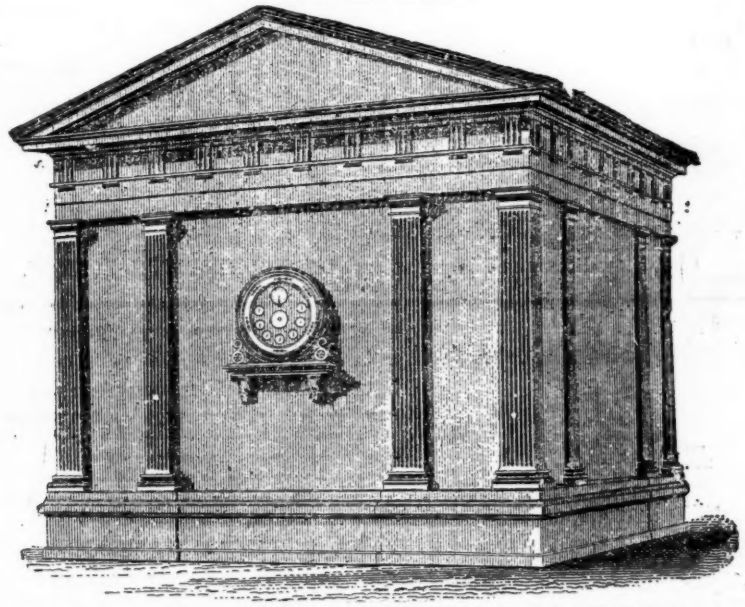

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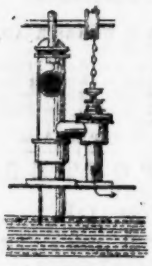

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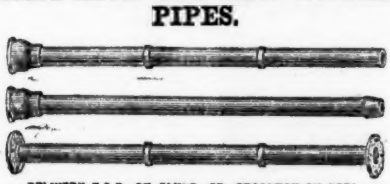

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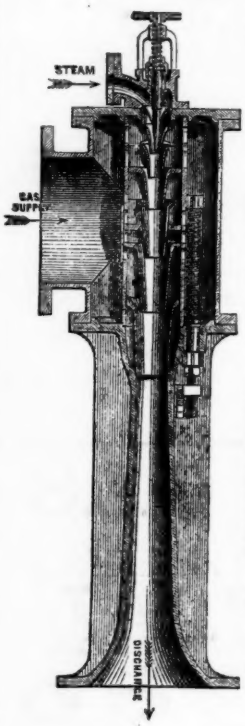

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NEAR SHEFFIELD,
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Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.
Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.
These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.
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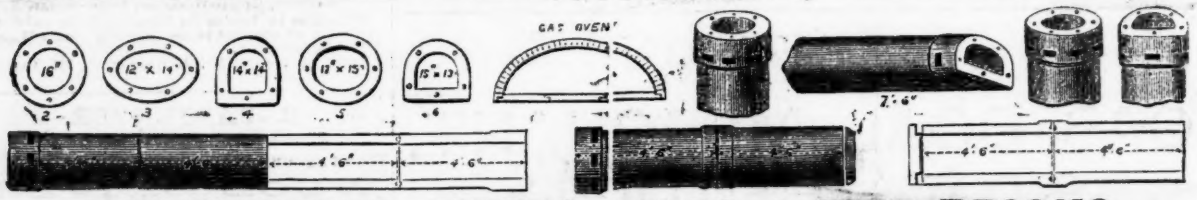

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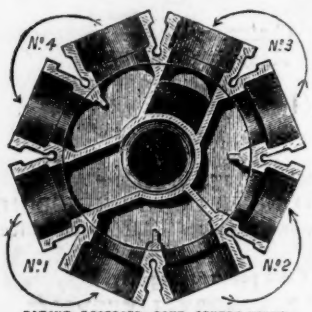

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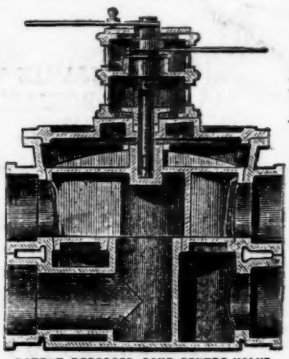

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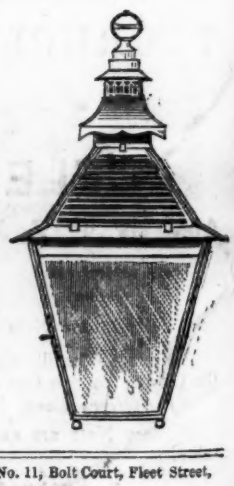

55 and 56, High Holborn, London.

London: Printed by WILLIAM BOUGHTON KING (at the office of Clayton and Co. 17, Bouverie Street, Fleet Street); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, January 30, 1877.